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Abstract

This document reports the second year of Project IMPACT (Innovation and Motivation in Polk County for the Advancement of Creative Teaching), an ESEA Title III inservice program concerned with the need to "humanize" the process of education and the need to develop innovative teaching methods which will aid productive thinking and minimize the old reliance on rote learning. Included are tabulation of the workshops, conferences, and meetings conducted since August 1968 to disseminate information and to initiate changes in attitude among the educators of Iowa; selected anecdotes and quotations representing the reactions of IMPACT teachers and students to the project; and review of the project's research regarding changes in teacher classroom behavior (particularly the thinking processes occurring in the classroom) and investigations concerning attitudes and self-concept of teachers and their students. Appended are rationale for the self-concept studies and the full project evaluation study, a report on the development and application of a criterion measure by which creativity in classrooms is to be evaluated, including description of the classroom behavior analysis using the Aschner-Gallagher verbal interaction technique and discussion of the research results. Included also is a copy of the published unofficial account of IMPACT'S development during its first year (before August 1968). (JS)

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Project IMPACT
Annual Evaluation Report
to the
Department of Public Instruction
State of Iowa

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Polk County Board of Education
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Des Moines, Iowa 50309

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SP003278

Preface

This Annual Evaluation Report is submitted in accordance with the Chief, Title III, ESEA letter dated May 2, 1969. That letter requested information concerning the operation of projects under Title III of the Elementary and Secondary Education Act of 1965, Public Law 89-10.

The acronym "IMPACT" was constructed from the words Innovation and Motivation in Polk County for the Advancement of Creative Teaching. The project began operation in August, 1967, on a two-phase basis. Phase I consisted of a series of two-day workshops for Polk County teachers and administrators; Phase II consisted of a six-week summer institute, also for Polk County teachers and administrators.

During its second year of operation, the IMPACT program has continued in this two-phase mode of operation. Its scope has been widened, however, to include educators from Area XI counties outside of Polk County. Additionally, in an effort to reach more educators, IMPACT has taken on a large inservice education task, making presentations and conducting workshops for educational institutions and agencies at many levels.

As Project IMPACT looks to the future, with the obvious decline of Title III funds coloring its perspective, a variety of courses is being considered, including cooperation with institutions at the higher education level, local school districts and the private sector. At this point, it is possible to make concrete assurances in one respect only: The Polk County Board of Education is determined that the many services instituted under Project IMPACT shall not be terminated.

Ralph C. Norris
Superintendent

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Chapter I: DISSEMINATION

In this chapter is presented a tabulation of the workshops, conferences and meetings conducted by the Project IMPACT staff since August, 1968. The purpose is to give some indication of the scope of the effort to disseminate information and to initiate changes in attitude among the educators of Iowa. The guiding principle in all of these gatherings has been two-fold: (1) the human intellect is capable of more thought, and more kinds of thought, than education has traditionally recognized, and (2) the affective climate of schools at all levels has too often in the past placed restrictions on the intellectual and creative potentials of students.

In its second year of operation Project IMPACT has reached educators throughout Area XI in Iowa and, in some instances, teachers and administrators outside Area XI. The extent and means of this dissemination effort are listed below:

PROGRAMS WITHIN AREA XI

Audience		Number in Audience	Number of Programs
Administrators			
Oct.	Area Administrators	120	1
Nov. & Feb.	Elementary Principals	25	2
Jan.	Dallas County	12	1
Feb.	Secondary Principals	14	1
March	County Superintendents	12	1
April	Iowa State University	15	1
May	Association for Student Teachers	50	1
Total		393	9

Professional Groups			
Sept.	University of Northern Iowa	50	1
Oct.	Association for Childhood Education	175	1
Oct.	I.S.E.A.	30	1
Jan.	Delta Kappa Gamma	40	1
Total		295	4

Student Teachers			
April	Iowa State University	40	1
May	University of Northern Iowa	30	1
Total		70	2

PROGRAMS WITHIN AREA XI (Con't)

Audience		Number in audience	Number of programs
Teacher Inservice			
Sept.	Woodlawn, Des Moines	60	1
Oct., Jan., & Feb.	Jensen & Blackhurst, Urbandale	25	4
Nov.	Valley & Stilwell, West Des Moines	150	1
Dec., Jan., April, & May	Mitchellville, Southeast Polk	16	5
Dec.-March	Johnston	65	9
Jan.	Ankeny& Southeast Polk	350	1
Feb.	Phillips, Des Moines	50	1
Feb.	Hillis, Des Moines	40	1
Feb.	Sacred Heart, West Des Moines	20	1
March	Panora-Linden	40	1
March	Oak Park, Des Moines	40	1
March	Des Moines Diocese	80	1
March	Lucas, Des Moines	25	1
March	Menlo	40	1
March	Wallace, Des Moines	25	1
April	Saydel	75	1
April	Central District Meeting	160	1
Total		1261	32

Parent Teacher Association			
Sept.	Rice, Des Moines	30	1
Jan.	Cowles, Des Moines	25	1
Feb.	Delaware, Southeast Polk	40	1
Feb.	Johnston	25	1
Total		120	4

	Number in audience	Number of programs
VISITATIONS TO TEACHERS	50	
VISITATIONS TO ADMINISTRATORS	19	
DEMONSTRATION TEACHING IN INDIVIDUAL CLASSROOMS	12	
IMPACT WORKSHOPS		4
IMPACT ADVISORY COMMITTEE MEETINGS		4
HIGHER EDUCATION MEETINGS--I.S.U., U.N.I., and DRAKE Planning for E.P.D.A. proposal	3	
INQUIRIES CONCERNING IMPACT--from 9 states and Canal Zone	25	

PROGRAMS OUTSIDE AREA XI

	Audience	Number in audience	Number of programs
Programs			
August	Laramie, Wyoming teachers	40	1
Oct.	Creighton University students	30	1
Feb.	Kalona jr. & sr. high faculty	40	1
March	Rockwell City Women's Reformatory staff	60	1
April	Council Bluffs teachers	150	1
May	Graceland College, Lamoni	50	1
Total		370	6

IMPACT MATERIALS

	Number of people checking out materials	Number of times checked out
Materials		
Library Books	350	1746
Films	30	58
Total	380	1804

Chapter II: ANECDOTES

The intention, in this chapter, is to present the subjective feelings that teachers and students involved in the IMPACT program have about the project. Only a few are listed here, but they are considered typical.

"IMPACT opened the door and 'becoming' is my byword. I still find discrepancy between ideas and practice but hopefully the gap is narrowing. IMPACT has truly helped me to make an effort toward the humanizing of education and teaching for thinking, two goals I feel imperative for the education of today's youth." Thus comments Susan Donielson, a kindergarten teacher at Elmwood School in Des Moines as she summarizes her reactions to experiences implemented by Project IMPACT.

The stories in this chapter are selective sketches of a few teachers and students whose daily routine has seen changes--changes that illustrate IMPACT's efforts to humanize education and teach for thinking. These episodes are presented, not as a report of every achievement in the program but as examples of events now taking place in Polk County and Area XI schools.

"I am anxiously looking forward to involvement in the IMPACT Summer Institute" writes Barbara Sweem, second grade teacher at West Elementary School in Knoxville. "It will round out very well what I consider my most rewarding year of service." Mrs. Sweem reflects on her activities during that period--

> At the first IMPACT workshop in October, we discussed Louis Raths' Teaching for Thinking. It was a good starting point for me. After reading the book, and re-reading it, concentrating especially on the first 112 pages, I gradually was able to implement some of of Raths' thinking "operations." During the next two months, I became more at ease with Raths' ideas, but I felt unsure my approach was effective. For a while I felt I was at a standstill. Some of the girls and boys seemed very reluctant to express themselves. I observed less adherence to routine and we were using fewer worksheets. Since we had been following a routine very closely and using many worksheets in previous years, it suddenly appeared that we were doing "less work."

> My interest in the project was spurred on, however, by the December and February IMPACT workshops. I caught some of the enthusiasm of the IMPACT staff and the guest speakers, demonstration groups and small-group activities among participants.

Mrs. Sweem concludes her comments with observations of specific changes she has noted in her classroom.

> At this point, I have observed a definite improvement in my classroom climate. Boys and girls who once seemed immature now give much more of themselves and act more maturely. In small group activities they have developed more effective listening habits and they seem to respect one another's opinion more.
>
> Discipline problems have lessened. Constructive criticism by their own friends is enough to help most of the children maintain their self-control.

Candid, off-guard comments from IMPACT students give further evidence of changes they have seen in their classrooms.

In a letter to her teacher (Miss Mary Patton of Rose School, Des Moines) seven-year-old Sandy included this sentence:

> I always yous to think school was no thing but walking up there and listing to a teacher talk. But now I know better. (sic)

Or consider these contributions from fifth graders in Mrs. Doris Stukenberg's (Oak Park School, Des Moines) room:

> You keep me from getting bored.
>
> I'm glad you don't put plans on the board and have the same subjects at the same time every day.
>
> I'm glad we can plan our own way of presenting work.
>
> You let us think and do stuff for ourselves.
>
> You don't have to work every second and don't have to have everything the same as everyone else.
>
> I've never had a teacher listen to me like this before.

> I thought you'd laugh at me when I told you I had a favorite god and goddess.

Following a Vocational Homemaking Unit encouraging them to search for answers to their own needs in Consumer Education, students of IMPACT teacher Mrs. Joyce Love, Woodrow Wilson Junior High School, Des Moines, explained the changes they had experienced this way--

> We became more aware of our responsibilities.
>
> We all prefer creative teaching because it is more interesting and when things are fun you learn more from them.
>
> It really involves the students.
>
> You get to know the other girls in your class a lot better because we have more discussions.
>
> We have learned to express ourselves better.

The kind of effort that seldom shows up in the data is revealed in this intuitive reflection of Des Moines East High School English teacher Mona Rieck.

> He missed a week of school in November after a slight mishap on a hunting trip. After he came back, he sat and stared out the window for months on end in my class. I left him alone. One day, he started writing; I still remember my sense of wonder that an "ordinary" boy could express so much, so vividly tell of his trauma from the near-miss, flesh-wound of a bullet in his thigh, his stark fear in one terrible moment that he might never again walk in the early morning across the beautiful land, believing he was a man.
>
> That was last school year. This year he is repeating the classes he failed because he sat and stared out the windows. I did not fail him, because IMPACT was supporting me in my first efforts to understand that learning is not a ritual dance, performed in a cage, to induce a rewarding symbol to drop into the grade book. While he had sat and stared, he had listened. And when his thoughts and feelings had re-arranged and organized and interpreted themselves, he had communicated, using

> every device of form, structure and semantics I had discussed during the year--while he had sat and watched the sky and the sun, the cloud shapes, the changing lights that he almost lost in one traumatic moment of his life.
>
> Sometimes, to an IMPACT teacher, the "reward" does not come on a sheet of paper. The IMPACT student is apt to grow beyond the teacher, and he hesitates to embarrass the teacher with the extent and depth of his knowledge and ideas. These are the students I have failed--not in grading, but in perceptiveness, and the act of humility so necessary to "teaching" as well as to "learning." I keep thinking of a cartoon showing a rat leaning against a lever in his cage and telling another rat: "Boy, do we have this guy conditioned. Every time I press the bar down, he drops a pellet in."
>
> Under IMPACT, I have learned to pass and fail myself, rather than pass or fail the student. (Assigning grades is merely the ritual dance of the pigeons, and I haven't yet discovered how to get my monetary rewards without going through this performance.) If I have any prayers about my teaching it is that I will know the difference between satisfying curiosity, and maintaining it in my students. For joy-in-learning-for-learning's-sake is a non sequitur if usable, convential knowledge is not available as an end product. But IMPACT adds the critical bonding agent: the joy of enquiry, the agent which is as important to the teacher as it is to every student in an IMPACT classroom, where there should be no pigeons, no rats, no failures--only the bonds of humanity.

Like RaeGene Robbins, tenth grade teacher at Lincoln High School in Des Moines, a number of teachers have noted that IMPACT's teachings for them are not new. Rather, the comment, they have gained far deeper insights into these self-same strategies or as Mrs. Robbins puts it--

> Through the IMPACT program I feel that I have gained a fresh view of teaching techniques. I do feel that I have been using, intuitively, many of the same approaches presented at IMPACT, but I had not analyzed "why" I was doing the things I was.

> The program has helped me understand the process of learning and to better be able to recognize the creative student, and offer him more opportunities.
>
> I think the most important gain has been in my awareness of the value of evaluation following each session of work. I used the group techniques I learned by allowing the students to be involved in the evaluation process. I have been keenly aware of the importance of letting the students discover what has taken place and what hasn't, and why.
>
> In my forensics class, in particular, I attempted honest communication by working to help each be truthfully aware of his or her particular "hang-ups" and became sensitive to the attitudes and ideals of the others in the class.

Typical of the experimental attitude that IMPACT people have acquired through their efforts is displayed by Sandra Porter, a second grade teacher at East Elementary School, Ankeny. Mrs. Porter was curious--who made the decisions in her classroom? Since one of the purposes of education is to develop the ability to make decisions--was she really giving children the opportunity to do this?

Using the Wolfson and Nash questionnaire "Perceptions of Decision-Making in Elementary School Classrooms"[1] she compared her answers with those of her students. Reflecting on the results Mrs. Porter comments,

> Ever since I've been in Polk County's IMPACT program, I've been hearing that I should give children an opportunity to think and to apply their thinking without the continual dominance of the teacher. They should be allowed to make their own decisions. I was, therefore, particularly interested in the results of this survey for my own classroom.

---

[1] Bernice J. Wolfson and Shirlyn Nash, November, 1968, Elementary School Journal. "Perceptions of Decision-Making in Elementary School Classrooms"

> On the whole, I was quite pleased with the results. However, the data made me very much aware of areas in which I need to do more work with the children to help them develop their own decision-making abilities. I think this survey is most satisfactory for helping any teacher answer the question, "Who's making the decisions in your classroom?"

In relating how IMPACT has changed his thinking, Lloyd F. Mussell, seventh grade English teacher at Merrill Junior High School, Des Moines, reported,

> To me IMPACT means freedom. If I were to list the primary idea which I received from my experiences with IMPACT, it would be that of recognizing, to an even greater degree, that students do have good ideas and need the freedom to express them.
>
> In most of my assignments I attempt to leave opportunity for individual choice. I have found that the students respond better to this type of assignment. Students have commented that they have enjoyed the assignments because they were allowed to express their ideas and not mine.

Mr. Mussell uses "brainstorming" techniques for developing language for descriptive writing. An especially interesting example of good description came as a result of one brainstorming session. It is an excerpt from a theme entitled "From Plant to Pumpkin."

> Zzzip! A razor sharp blade slashed through. The knife cut a circular path through my mother's head. The top was pulled off. Suddenly there was a bright light. A glittering spoon came down and dug several of my brothers and sisters out. Now I am outside my mother.
>
> All of my life I've been living in total darkness. Soon a weird looking creature put me on a feathery, soft cloth with my brothers and sisters. He carefully wrapped us up and stored us away. It was miserably black again. When will I ever get out of darkness?

As they discover new techniques which foster creative thinking and humanizing skills IMPACT teachers and administrators frequently exhibit a great zeal for "spreading the word." In Panora-Linden School District, Merna Teale and Mary Lou Hesse, first and second grade teachers at Panora Elementary School organized an inservice workshop for all their staff members. When asked for feedback of their reactions and those of other participants these teachers wrote,

> "Excellent brainstorming session." This was a typical response to the first IMPACT inservice workshop involving the faculty of Panora-Linden Community School District. The session was held on March 4--a five-hour group participation effort. Mr. Jack Sims, IMPACT secondary education consultant, described the IMPACT program to our faculty and explained that we would concentrate on group-process during this workshop.
>
> The Panora-Linden faculty was divied into groups of about 10 and each was assigned a "facilitator" and an "observer." The IMPACT teachers from our district and the IMPACT staff members filled these posts. The primary concern was to learn to establish an atmosphere in group situations in which all members could (and would) express their own opinions.
>
> At 8:30 in the evening--nearly six hours after the workshop started (it followed a nearly normal teaching day)--we assembled as a large group for questions and for an evaluation of the day.
>
> Surprisingly, after such a strenuous day, only one person indicated the workshop was "not satisfactory." A whopping 85.9% of evaluation responses were "satisfactory" or above. Some of the teachers listed personal remarks, including:
>
> Now that we have the basic background, we need another workshop showing and telling us how to put the knowledge to use in our own classroom situation.
>
> Communication lines between high school and elementary school teachers were opened.
>
> Turned over a few brain cells, and think this was a valuable experience in thinking of creativity, which can be used in school and in life.
>
> Our overall impression was that the IMPACT workshop was unusually satisfying to our teachers and we hope it will serve as an inspiration for future teacher workshops.

Ruby Cabaret and Carol Cardwell of Delaware School, Southeast Polk District detailed another kind of plan for sharing IMPACT's ideas with teachers in the district. In an invitation to these colleagues they said in part,

> We are trying to work out a plan whereby all who are interested may join with us in discovering how to implement many of these ideas in our daily classes.
>
> The IMPACT office will provide us with material packets towork with. They will also plan guest speakers and demonstrators at a time we could all attend.
>
> The plan that the Southeast Polk Alumni (teachers who have completed one year in IMPACT) have worked out would involve us in one meeting a month in our own buildings and one meeting a month with all the schools meeting at the high school. We will also be ready to help you at anytime, as you try to implement the ideas in your daily teaching.

Later Mrs. Cardwell commented, "We have had an enthusiastic response here!"

Lynn Hullinger, 5th grade teacher at Four Mile School in the Southeast Polk District eagerly endorses the Project with, "I feel IMPACT has been one of the greatest, if not the greatest enlightenment into problems in motivation and creativity."

But in a more sober vein Mrs. Rieck echoes the sentiments heard many times over from IMPACT participants--"the value of the program to me has been to give me the courage to try to do the job I've always wanted to do--help the kids to learn."

Chapter III: RESEARCH

Chapter III briefly sketches the objective evaluations, qualitative and quantitative, which have been made of Project IMPACT and its participation.

Research carried out to evaluate Project IMPACT has been aimed at trying to assess the progress it has made toward its goals. As the objectives and goals of the Project evolved, investigations appropriate to the new directions have been started.

Throughout the year the staff of IMPACT has carried out a number of evaluative and research projects. Some have had as their primary objective assessment of specific efforts of the Project such as effectiveness of a workshop or usefulness of certain materials provided to the participants. Others have attempted to assess more fundamental, basic, or underlying variables related to the Project and its participants. In general, IMPACT research designs have been based on research findings about creativity and creative teaching from related and pertinent investigations by others.

In order to establish a framework for considering the various research investigations carried out in connection with the Project during 1968-69, the studies have been categorizes into three major areas:

(1) Research on changes in teachers in terms of their classroom behavior, especially their "thinking."

(2) Investigations concerning attitudes and self-concepts of teachers and their students.

(3) Questionnaires administered at the end of each workshop to determine which specific approaches used were the most effective.

Some studies have been entirely completed this year; however, most are longitudinal investigations in which future measures will be made at appropriately-spaced intervals over an extended period of time.

Two major types of investigations have been carried out.

> Pre and post studies. Participants were measured early in the Project, then subsequent measures taken later. Such studies are designed to assess change in the same individual overtime.

Studies have been designed for the collection of data on participants for as long as five years after they leave the Project. A number of evaluative measures used this year will be repeated at the end of 1969. The assessment techniques and procedures planned to continue for five years are those related to measuring change in individuals and in their teaching behavior after exposure to IMPACT's ideas and subsequent application of these in the classroom.

> Control group studies. There were certain evaluation measures in which participants and their students were compared with control subjects. A control sample was established from the school districts in Polk County chosen to be matched with the Project participants on (1) proportion of teachers and administrators, (2) age level taught, and (3) subject matter. These were determined to be the most appropriate and relevant variables for matching.

1. Research on changes in teachers classroom behavior

The major research of the year was an investigation of changes in thinking processes of teachers in Project IMPACT as time elapsed. Project teachers were also compared with the matched control sample of teachers.

Audio tape recordings were collected from the classrooms of teachers in the IMPACT and the control sample. Subsequently these were played back and analyzed according to a technique known as "verbal interaction analysis." In this procedure a count or tally is made every fifteen seconds of the kind of thinking occurring at that instant. In the kind of interaction analysis used, the conceptual framework was that of Dr. J.P. Guilford, expressed in his model of the structure of intellect.

A report of the research is attached in Appendix I.

The two main findings are:

(1) IMPACT training greatly reduces the amount of non-thinking time in classrooms.

(2) IMPACT training greatly reduces the proportion of time which the teachers talk versus time spent in students' talking.

The major data for this study were collected last year, but the analyzing of tapes was carried out in the summer and fall of 1968. Then a second tape was collected in April of 1969 on a small sample of the originalteachers in the Project. Thirty six tapes were analyzed in this longitudinal follow-up of the original study.

Findings from these data support the original results in all cases.

2. Investigations concerning attitudes and self concept of teachers and their students

One of the emphases of IMPACT has been training aimed at humanizing the classroom. Attitude measurement, especially that body of attitudes related to the self seemed especially appropriate to be used as a criterion for measuring possible changes in this area.

It was felt that the area of measurement of self concept of both students and teachers was of major importance. There was considerable interest in determining the extent to which the self concept of a teacher is reflected in her pupils, i.e., the extent to which self concept attitudes "transfer." A study is being conducted at present to give evidence for answering this question.

The Tennessee Self-Concept Scale was administered to all the IMPACT teachers in April,1969. For the children of elementary teachers with "contained" classrooms, an instrument called Stanley Coopersmith's Inventory of Self Esteem, was administered to learn if the self concept of the teacher was reflected in that of her pupils. The mean self-concept score of the class (all pupils of one teacher) was administered to learn if the self concept of the teacher was reflected in that of her pupils. The mean self-concept score of the class (all pupils of one teacher) was determined; these mean self-concept scores of a class was correlated with the self-concept score of the class teacher. The resulting correlation was .416, which suggests a relationship between the two which is considerably greater than chance.

A further study is underway to determine if there is any relation between a self-concept measure and the kinds and proportions of thinking process used in the classroom.

For the criterion of thinking processes, the Aschner-Gallagher inter-action analysis technique is again being used on audio tape recordings of classrooms.

Several research projects concerning self-concept measurement are now being carried out. An outline of these is attached, along with the rationale on which they are based, in Appendix II.

3. Questionnaires administered to participants of the Project

At the end of each workshop a questionnaire was given to the participants evaluating various aspects of the workshop.

In general these data were used to determine future directions of the project rather than as a tool for basic research.

In summary, the research efforts have been generally directed in two directions this year, measurement of:

(1) Thinking processes occurring in the classroom

(2) Measurement of attitudes, especially that body of attitudes generally termed the self concept.

Chapter IV: RELATED PROJECTS

During the past year, several inservice education projects have evolved from the philosophy and methods which Project IMPACT is exploring. In all cases, these local inservice projects have been developed with the active encouragement of the IMPACT staff.

The Mitchellville Program:

Mitchellville Elementary School, in Southeast Polk School District, has established a five-month inservice program for its teaching staff centered on ideas from Project IMPACT.

During the 1968-69 school year, the inservice program at Mitchellville concentrated on the following areas:

1) Pupil-team learning
2) Process groups (interpersonal communications)
3) Motivation
4) Teaching-for-thinking activities
5) Teaching productive-divergent thinking
6) Effective classroom questioning techniques
7) Inquiry approach to learning
8) Instructional (behavioral) objectives

The Mitchellville teachers met twice each week after school to work in these subject areas. Project IMPACT assisted the Mitchellville faculty by providing materials, acting as a "sounding board" for their ideas, and providing staff members to work in the inservice meetings upon request.

The Panora-Linden Program:

Panora-Linden Community School District teachers have been working in the area of "group process." The techniques of interpersonal communications necessary for their program were explored initially in a workshop with the IMPACT staff on March 4, 1969. Based on the concepts of group dynamics they developed in that session and succeeding meetings, the Panora-Linden faculty will carry out an ongoing inservice education program beginning next fall (1969).

The Panora-Linden teachers will attempt to utilize the techniques of group process to attack problems they feel are most pressing in their local situation. Some examples of these problems:

1) Teacher-community relations
2) Teacher-administration communications
3) Staff evaluations
4) Promotion of creative thinking in the classroom

The IMPACT staff will provide assistance to the Panora-Linden teachers in the carrying out of this inservice program upon request.

The Des Moines Catholic Diocesan Schools Program:

In August 1969, the school system of the Catholic Diocese of Des Moines will sponsor a week-long workshop for teachers in the parochial schools of greater Des Moines, to be called an "INNOVATIUM." The workshop will concentrate on five instructional areas:

1) Effective questioning techniques
2) Teaching for creative thinking
3) Humanizing education
4) Behavioral performance goals
5) Working with children in groups

The INNOVATIUM will be attended by about 50 teachers from Catholic schools, who will then become a nucleus for the training of other teachers in the Diocese (which covers about 23 counties of southwest Iowa).

During the 1969-70 school year, Christ the King School will be used as a project school for this training in the broad areas of creative teaching and humanizing the education process. The IMPACT staff will be available to assist the Diocesan teachers upon request.

The Adel and Ballard Programs

Two Area XI school districts are planning a series of inservice meetings during the 1969-70 school year. Assisted by the IMPACT staff, each will concentrate on the two broad areas of teaching-for-thinking and humanizing the education process. Specifically, they will study:

1) The Guilford structure-of-intellect model
2) Williams' productive-divergent thinking model
3) Raths' thinking exercises
4) The Aschner-Gallagher method of verbal interaction analysis of classroom behavior
5) Stimulation of the various levels of thinking in children (which will involve demonstrations by the IMPACT staff or by IMPACT alumni teachers)
6) The construction of classroom questions based on Bloom's taxonomy of the cognitive domain
7) Interpersonal communications
8) Rogge's self-assessment inventory
9) Recognition of affective behavior
10) Pupil-team learning techniques
11) The ASCD (Association for the Supervision of Curriculum Development) approach to humanizing the classroom
12) Hunter's motivation and reinforcement methodology
13) The implications of Marshall McLuhan's work for education

The Blackhurst and Jensen Program

Blackhurst and Jensen schools, in the Urbandale Community School District, have devoted a series of inservice programs to the concepts of productive-divergent thinking. They were assisted in these meetings by IMPACT staff members.

The Des Moines Program

The Des Moines Independent Community School System has committed itself to devoting inservice work on the part of the faculties of one junior high school and two feeder elementary schools to an inservice program in the 1969-70 school year. The program has tentatively been aimed at the study of substantially the same specific areas as those listed under the Adel-Ballard program above. At a meeting with IMPACT staff members, the Des Moines central office staff indicated a desire to have the three schools function as special project schools in the area of creative-productive thinking and humanizing teacher-learner relationships. In this program, it was indicated, the faculties of the three schools will work closely with the IMPACT staff.

Chapter V: PROJECT CONTINUATION

The history of Project IMPACT has been one of constant change and development. At present, a variety of alternative courses and combinations of courses for the future of the IMPACT program are being explored. In the meantime, the basic job of providing inservice education in creativity to teachers in Polk County and Area XI remains. In this chapter, an indication is given as to how that task will be carried on, regardless of other developments.

As was indicated in the Preface, plans for continuing the inservice education activities of Project IMPACT are constantly being developed. Much more financial involvement by Polk County and Area XI local school districts is anticipated for the 1969-70 school year. This involvement is anticipated because of: (1) cutbacks in Title III funds and (2) local school systems recognition of the intermediate unit as an important inservice education resource.

For the third year of the project, it is anticipated that Title III funds will be cut to $90,000 from $164,000. Consequently, pay for teacher substitutes and stipends for Saturday sessions will be discontinued. Many school systems have indicated, through their administrative heads, their intent to provide released time to teachers for the IMPACT inservice education programs. This released time for teachers will be provided for either by hiring substitute teachers or through early dismissal of students.

By eliminating the need for funds to pay teacher stipends for Saturday sessions and hiring substitute teachers, and involving local school systems to provide for teacher released time, operational funds for the third year need not be maintained at the levels of the two previous years. In addition, Title III funds have provided the IMPACT staff with: professional library resources, audiovisual equipment to help conduct inservice education programs, video recording capacity, and expanded office printing and duplicating facilities. The cost of most of these materials is non-recurring.

Basic financial needs for project continuation focus on staff salaries, research, travel, and periodic additions to the library. Most of the anticipated Title III funds for the fiscal year beginning July 1, 1969, will be used to pay project staff salaries. The Polk County Board of Education has already indicated its willingness to continue the activities of the project when Title III funds expire June 30, 1970.

The second summer institute, which will involve nearly 500 students and 125 teachers, will be held at Stilwell Junior High School in West Des Moines beginning June 9, 1969, and continuing through July 11. With continued cooperation from Drake University, it is believed that this program, too, can be continued with a minimum of expense.

The College of Education at Drake University will offer six semester hours of graduate credit to all summer institute participants. Since Project IMPACT is providing most of the institute staff, the tuition cost for the graduate credit has been greatly reduced. Also this year's institute calls for a $300 teacher stipend for attending the institute. Perhaps next year, the need for teacher stipends to induce teachers to attend the summer institute can be eliminated. Six semester hours of graduate credit from Drake University may be sufficient consideration in order to obtain summer institute participants.

It is believed that the phasing-out of the need for Title III funds will be completed by July 1, 1970. However, if the project continues to expand the scope of its program as well as the geographical area served, supplemental funds from Title III, EPDA, and other appropriate federal sources will be sought.

APPENDIX I: EVALUATION OF PROJECT IMPACT

Evaluation of Project IMPACT

Creativity in the Classroom

Norma Trowbridge, Ph.D.
Director of Research, Project IMPACT
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There are ideas about the relationship of federal and foundation funds to research which I would like to express.

If this work has merit and value, it is because I had the time to give to it that funds from the United States government and foundations bought for me. Particularly valuable in investigation of creativity in schools, an area with little agreement on either definition or criteria, was that funds were always given in a spirit of unquestioning trust. There were no confining pressures. Such freedom has permitted me to obtain a larger view, to play around with ideas, to take time for speculative thought, to follow leads unthought at the Project's conception, to develop new hypotheses as the Project's emphases changed, to rethink original objectives, and to develop related ones only now emerging.

I received assistance mainly from Project IMPACT, but also from Drake University and from the Union for Research and Experimentation in Higher Education administered at Antioch College. Such sources give scholars freedom, a freedom I am grateful to have shared.

Evaluation of Project IMPACT

Creativity in the Classroom

The stated purpose of Project IMPACT[1], a large scale, federally funded, three year project is to promote creativity in the classroom in order to encourage creativity in students' entire lives.

Creativity is an elusive concept whether the emphasis is on the teacher, the student, or the teaching-learning process, and any meaningful evaluation of IMPACT depends largely on the criteria by which creativity is judged. As in most creativity research, the criterion problem is both the most critical and the most difficult.

This paper is a report on the development and application of a criterion measure by which creativity in classrooms is to be evaluated for the purposes of Project IMPACT. It consists of (1) a conceptual definition of creativity, (2) a measuring instrument which makes possible the appraisal of classroom teaching-learning behavior in terms of the conceptual definition, and (3) application of the instrument during the Project's first year.

Therefore, the conceptual definition of creativity plus the measuring tool together form the criterion by which IMPACT's success is to be evaluated. This criterion measure will be used to establish the value of IMPACT's various programs during the three years of the Project's operation, as well as in longitudinal studies for at least five more years.

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[1] Project No. OEG-3-7-703575-5055—a three quarter million dollar project funded under Title III Public Law 89-10, to Polk County Board of Education, Polk County, Iowa, with the aim of supplying inservice education to teachers to encourage creativity in the classrooms of the nine school districts of the county.

Assessments made during the first year of the project will provide bench marks or base lines by which to evaluate future measures on the same teachers, students, and classrooms. Especially meaningful in terms of establishing long range results will be appraisals made four or five years after completion of the project. Educators want to know what evidence of change will be present five years after federal funding ceases.

This report discusses research findings made during 1967-68 on the use of the criterion as a measuring stick by which to evaluate IMPACT's efforts in its first year of operation. All research investigations other than those related to the criterion measure are published separately in Project IMPACT's U.S. Office of Education Research Reports, 1968 (Trowbridge).

Critique of Previous Assessment Measures

In choosing a conceptual definition for the measurement of creativity in any field the researcher has three alternatives (Taylor, 1964). He can define creativity in terms of (1) the person, that is, his traits and characteristics, (2) the creative process, or (3) the products or productions of creative efforts. All three approaches have proven productive in numerous studies.

Researchers in IMPACT have done a great deal of measurement of persons, both teachers and administrators in the Project and their students. The staff has measured teachers participating in the Project and their matched comparison sample with a wide array of instruments designed to assess various aspects of their persons including (1) an attitude measure, the Minnesota Teacher Attitude Inventory (Cook, 1963), (2) a personality measure, the Edwards Personal Preference Schedule (Edwards, 1953), (3) a biographical inventory developed by the staff similar to those used by numerous creativity researchers, (4) two creativity measures (Guilford, 1960; Mednick, 1966), and (5) a value scale, the Ideal Pupil Checklist (Torrance, 1965).

Researchers have also collected various measurements on stratified samples of students in classrooms of participating teachers, using (1) both figural and verbal Tests of Creative Thinking Abilities (Torrance, 1965), (2) a Self Esteem Inventory (Coopersmith, 1966), (3) judgments of student classroom behavior made independently by three teachers and ten peers, (4) judgments of creative productions or products made by students in the areas of art, writing, and math problem solving, as well as (5) informal student assessments. However, at the heart of the work has been the search for some meaningful measure of actual ongoing behavior in the classroom, one which would most closely approximate the "ultimate" criterion of creativity in teaching for which the project was developed, some measure of the nine-to-three daily occurrences in the classroom.

Numerous psychologists and educators share in this search for more adequate definitions and criteria of creativity. The creativity instruments used in the Project seemed to have serious limitations for IMPACT's creativity measurement purposes. Major limitations found in IMPACT studies were associated with time limits and test structure limits. IMPACT's experience in testing children revealed serious problems associated with requests to do the tasks under time limits; start now, stop now. Children judged most creative (by other criteria established by the Project) largely ignored the specific test tasks and time limits such as those proposed in Torrance's tests. Over 65% of the more creative children did relatively little during test time, whereas on other days, usually later in the same week they made their own versions of the test's tasks or innovations of test items in an unstructured untimed setting.

Teachers and school administrators also frequently ignored both the structure of the test tasks and time limits imposed and proceeded to build their own tasks at times of their own choosing. When time limits were called they handed in papers often unrepresentative of their ability. In Mednick's Remote Associations Test more than two-thirds of the more creative teachers (as measured by IMPACT's creativity criteria) preferred to compose their own sets of remotely associated words rather than reply to test items. Similarly in Guilford's tasks, over 65% of the more creative teachers ignored test instructions to some extent and, according to their own report, thinking about other relationships and ideas generated from test tasks, but answered test items very inadequately in terms of scoring as designated by test instructions. For adults, also, time restrictions posed serious limitations with individuals sitting back and thinking or"playing around'with ideas during the testing situation, and days after the test was administered, coming up with responses which would be judged extremely highly creative by the test instruction's scoring approach. As mentioned, even more frequently teachers preferred to make adaptations to Guilford's and Mednick's tasks or compose new ones. Results of such test scores were not congruent, therefore, with much other data collected on students and teachers in terms of their creative behavior. One teacher remarked succintly, "Creativity can't be turned on and off to fit time limits." Perhaps, IMPACT's teachers and students are less conforming than the average, but the outwardly cooperative test taker may be inwardly non-cooperative. So his test scores appear low. An important finding was that the sample of teachers matched to the IMPACT sample were more willing to conform to the time limits and structure of the test tasks.

The concept of structure in relation to creativity measurement is an intriguing one. Structure is generally thought to be conflicting and contradictory to creative thinking, especially in divergent thinking stages. Though abhorrent to the creative process itself, structure seems necessary in building an instrument which can be scored. At certain stages of creative effort structure does seem to emerge in the thinking processes, but this is generally considered to occur late in the creative process. Structure is present from the start in items used on creativity instruments. When tasks structure the way a response should go, other possibly creative responses are already eliminated. An item which asks to list the uses of a pencil, brick, or tin can, or to make up questions about a picture already has structured the responses considerably. Figural tests also impose structure, sometimes inhibiting or at least highly directing the response. Present tests seem limited in measuring the thinking processes of a person as he synthesizes an array of ideas into some new production. To the extent the subject area or content is structured or set, the individual who doesn't think productively within that set is scored lower on the creativity measure.

To sum this dilemma, scoring of creativity measures seem to make structure necessary; structure itself is inconsistent with the encouragement of divergent thinking, so the more creative thinker ignores the structure of the tasks thereby invalidating the test.

A second limitation found in current instruments is that they assess only various sub-sets of the entire creative whole. A partial solution to this problem is the multiple criteria approach. However, even using a wide array of approaches, the whole of creativity is far from reached.

The third limitation found in IMPACT research is that testing instruments which require a situation in which the subject obviously knows he is being measured change the variables being measured. Over and over the testing situation itself changed the behavior being appraised.

The fourth limitation involves the limited validation of creativity instruments. Although much has been done in validating creativity tests, additional cross-validation studies are greatly needed.

The fifth major limitation was the severe lack of performance tests, or of any form other than paper and pencil measures.

Development of Conceptual and Operational Definitions for the Criterion Measure

After using and evaluating combinations of creativity instruments in the search for a criterion measure, it was finally decided that classroom behavior for purposes of creativity assessment could be studied most meaningfully in terms of the thinking processes occurring there. No structure as to subject area, place, time, or materials was to be imposed. The staff chose as a theoretical and conceptual base Dr. J. P. Guilford's concept of creative thinking operations, developed as part of his well known "structure of intellect" model (Guilford, 1956 and 1968).

Guilford's concept of creativity is developed largely in terms of divergent thinking processes. If this conceptual model is applied to creativity in teaching it must encompass both thinking in the classroom and, ultimately, thinking of the student outside school as well. The study reported here, however, is limited to measurement of thinking processes in the classroom, the kinds and amounts occurring in various situations.

Having accepted Guilford's conceptual definition of creativity, the staff chose as an operational definition the quantity of creative-thinking processes as conceptualized by Guilford. These were to be measured from large samples of classroom behavior recorded on audio tape. Guilford's five general classifications of thinking processes, each with sub-classifications, are defined as follows:

(1) memorative--simple recall or retrieval of information.

(2) cognitive--recognition or knowing, simple understanding.

(3) convergent--thinking processes involving use of memory and cognition as well as analysis and integration of data and experience, generally designed to arrive at one expected result.

(4) divergent--thinking processes usually designated as "creative thinking," such as originality, flexibility, fluency, elaboration, and synthesis, in which there may be multiple appropriate responses.

(5) evaluative--thought processes involving value rather than facts or data, and concerning thinking of a judgmental nature. At times the person uses a given value dimension; other times he must construct his own value dimension and subsequently judge something according to this scale.

IMPACT's primary operational definition of creativity consisted of the proportion of divergent thinking processes as defined by Guilford exhibited in the classroom. A second operational definition evolved which included some convergent and evaluative thinking in addition to divergent thinking as Guilford's work now includes these processes as part of creative thinking.

Selection of a Measuring Instrument

With the conceptual and operational definitions agreed upon, the next step was a search for an instrument or tool to measure the kinds of thinking occurring in classrooms, specifically the types and amounts of various divergent thinking processes (fluency, flexibility, originality, etc.). Dr. James Gallagher and Mary Jane Aschner had already attempted to solve this same problem by developing a form of interaction analysis specifically designed to measure Guilford's thinking processes.

Other forms of interaction analyses are available as techniques for studying and measuring different aspects of verbal expression among persons in classrooms as well as other situations. Commonly used techniques measure such variables as who is speaking, whether a statement is a question or a response, who initiates the question, and the emotion involved, (Amidon and Hunter, 1966; Bales, 1950, Flanders, 1960).

The Aschner-Gallagher form of verbal interaction analysis, however, is specifically designed to measure various kinds of thinking processes, and to classify verbal expression in an interacting group. It does this not in terms of questions and responses or who initiates them, but in terms of actual thinking processes and classifications defined in Guilford's model. In effect it is an operational technique to measure Guilford's conceptual definitions of various thought processes. Since the aim was to assess thinking processes actually occurring in the classroom, the Aschner-Gallagher technique seemed most appropriate. This is not a test and involves no test taking situation nor test items.

In the Aschner-Gallagher method a count or "tally" is made every fifteen seconds concerning the kind of thinking process occurring at that instant, subsequently classified according to Guilford's categories. The results are displayed as percentages of time. A manual providing numerous examples of teacher and student responses is used to train persons observing and analyzing the classroom behavior to classify the verbal responses.

Aschner and Gallagher found it difficult to separate memory from cognition, and therefore tallied these two thinking processes as one. They also found it necessary to add a category which they labelled "routine" to account for time when verbal responses indicated no real thinking processes were occurring. The routine category contained processes related to classroom management, such as announcements, procedural instructions, taking a count of persons or things, moving to various seats, passing out books or materials, requests for order such as "Settle down now," and other similar activities.

Method

Samples of Classroom Behavior

The interaction analysis method for this investigation was applied to audio and video tape recorded samples of classroom behavior. Classrooms studied were at both elementary and secondary levels in the school districts of Polk County, Iowa, the area served by Project IMPACT. The period of study was the 1967-68 school year.

Two sets of samples were collected. A small sample involving IMPACT teacher-participants was selected to study change in behavior over time. A much larger sample of both IMPACT and non-IMPACT teachers was chosen to determine whether differences exist between classrooms with IMPACT teachers in charge and those taught by non-IMPACT teachers.

Sample for study over time. The first interaction analyses were performed on samples of regular classroom behavior of 22 IMPACT teachers in October 1967, at an early stage of IMPACT's operation. A second set of analyses of the same classrooms took place in May 1968, after seven months of IMPACT inservice teacher training. A third set of analyses were made in July 1968, at the end of an intensive six-week full-time institute sponsored by IMPACT. This third set of interaction analyses involved the same 22 teachers as the first two sets but concerned different students who were selected to participate in the summer institute. Thus the sample of children whose data occurs in the third set of interaction analyses is different.

Sample for study of IMPACT versus non-IMPACT. The IMPACT (or experimental) group in the sample consisted of 108 classrooms taught by IMPACT participants. It included the smaller sample of 22 studied "over-time" in May 1968. The non-IMPACT group (comparison sample) consisted of 114 classrooms from the same school systems but taught by teachers not associated with the IMPACT project. Samples were matched as closely as possible as to (1) school district, (2) age level of children in the classrooms, and (3) subject matter taught.

Application of Aschner-Gallagher Technique

The Aschner-Gallagher verbal interaction technique was applied in accordance with the A-G manual to classroom samples chosen for analyses as follows.

(1) At first the researchers provided long playing tape recorders in classrooms to record most of the entire school day, later attempting to measure random ten minute samples from these tapes. This proved unworkable because of the extremely small proportion of the school day in which teachers and students were in an interacting situation. One intriguing result of this pilot study was the finding that non-thinking activities comprised an even larger percentage of the school day when assessed in this method than when measurements were made on the interacting situation alone.

Therefore, it was decided that the observation period would be a one-hour continuous segment of classroom time. Since the technique requires a situation in which verbal interaction is occurring between teacher and students the teacher was allowed to select the starting time. Only a 30 minute period was ultimately measured. Observations were made every 15 seconds, giving a total of 120 tallies for each classroom segment. Usually, the first 30 minute period was used as the measured sample, but whenever part of the tape was unintelligible, the immediately subsequent intelligible segment was used to fill out the full 30 minutes.

(2) In most cases, the verbal interaction was recorded on audio tape and analyses performed by replaying the tape, using three different "raters" classifying the responses independently. In some cases, however, the analyses were performed by having three raters in the classroom classifying responses as they occurred, without using a tape recorder. In still other cases, a video tape recorder was used. The audio tape recorder seemed to disturb the normal operation of the classroom less than the video tape recorder or three observers and therefore tended to have less contamination effect. Students were usually unaware of the measurement situation, though teachers were aware the class situation was being recorded.

(3) The classification of verbal responses required by the technique were made by persons trained by the chief researcher, each of whom made independent judgments. Considerable training and practice were required to achieve rapid recognition of the various thinking operations. All tapes were analyzed independently by three different listeners, the entire IMPACT versus non-IMPACT sample being analyzed by the same three persons. Evidence of inter-analyst reliability will be presented later.

(4) There were major advantages (other than lack of disturbance and the absence of a test taking situation) to the audio tape method. The analysts themselves did not need to make appointments with teachers and travel around the county. Instead, they could analyze the tapes in their own offices. Both audio and video taping methods, of course, had the advantage of producing a record which could be assessed and re-assessed at future times, an especially valuable feature in appraising situations on which raters disagreed.

(5) Verbal behavior of the teacher was assessed separately from responses of students so that a two-way category, teacher versus class, emerged in each classification.

(6) When there was silence at the 15-second time mark, the observation was credited to the teacher or the students based on the immediately preceding verbal response. The *kind* of thinking process also was recorded as that indicated by the immediately preceding speech.

Results: Study Over Time

Tables 1 through 4 summarize interaction analyses on the smaller IMPACT sample studied over time. Each table is based on 22 interaction analyses of actual classroom behavior for each of three time periods, (October 1967; May, July 1968) and 120 observations per interaction analysis period.

Chi square tests were applied to data shown in each of the tables.

Table 1

Study Over Time
Percent of Time During Which Teachers and Pupils Talk

	Teacher Talking	Pupil Talking
Oct., 1967	66.1%	33.9%
May, 1968	58.6%	41.4%
July, 1968	42.2%	57.8%

By χ^2 test these differences were significant beyond the .05 level.

Table 1 shows the percent of the every-15-second observations credited to the teacher as talking as opposed to those where the student was heard, and compares the three time periods on this score, thus indicating the percentage of time the teacher is talking in each case. A marked decrease in the time the teacher talked is noticeable as the year progressed. Conversely, the percentage of time pupils talked had to go up. In both the October and May samples the mean amount of time in which the teacher was talking was over half, but in July this was reversed with students talking over half the time.

Table 2

Study Over Time
Number of Interaction Analyses Showing Percent of Time Teachers Talk

Percent Observations Teacher Talking	Oct., 1967	May, 1968	July, 1968
0-19 %	0	0	5
20-39	2	4	4
40-59	8	9	7
60-79	8	7	6
80-100	4	2	0
Total	22	22	22

By χ^2 test these differences were significant beyond the .05 level.

Table 2 shows the same data as Table 1 showing the frequency distribution rather than simply the mean results. Table 2 indicates the number of analyses falling within various ranges of teacher-talking percentages, and thus gives some indication of the frequency distribution which gave rise to the mean results shown in Table 1. The table indicates the actual number of classrooms in which the various amounts of teacher-talking were observed. The data dramatically show a movement as the year progressed from a preponderance of teacher-talking and little pupil-talking to a reverse situation in the last samples. In October and May there were no classrooms where the teacher talked less than 20% of the time, whereas in July there were five classrooms in which the students spoke more than 80% of the time. Similarly, in October there were four classrooms in which the teacher spoke more than 80% of the time, only two in May, and none in July.

Table 3

Study Over Time
Percent of Time Spent in Various Thinking Processes

	Memory and Cognition	Convergent	Divergent	Evaluative	Routine
Oct., 1967	19.2%	21.4%	10.8%	10.3%	38.3%
May, 1968	14.7%	12.2%	24.1%	19.8%	29.2%
July, 1968	14.6%	20.3%	25.2%	26.7%	13.2%

By χ^2 test these differences were significant beyond the .05 level.

Table 3 displays the percent of the observations classified by thinking process, or in the routine category if no thinking activities were occurring at the observation time. The comparisons of percentages credited to divergent thinking is the most useful portion of Table 3 because it forms the working measure of IMPACT's operational definition of creativity in the classroom.

The most unusual finding is the large drop in percentage of time spent in non-thinking activities, from over one-third in October, to less than a third in May, and only 13% in July. Time not spent in classroom routine seems to have been used mainly in an increased percentage of divergent and evaluative thinking. Divergent thinking percentages rose from about 11% in October to 25% in May and July, while evaluative thinking percentages had a reasonably similar rise. The change in convergent thinking percentages poses a problem, being about 20% to start, dropping to 12%, rising again to 20%. Guilford's thinking (1968) suggests that a rise in divergent thinking seems to be accompanied by a rise in convergent; his findings also suggest a rise in evaluative thinking accompanying a rise in divergent. In any case, the percentage of time spent in pure memory and simple cognition has decreased in IMPACT teachers over the year, and encouraging phenomenon.

Table 4

Study Over Time
Number of Interaction Analyses Showing Percent of Time Spent in Divergent Thinking

Percent of Observations of Divergent Thinking	Oct., 1967	May, 1968	July, 1968
0- 4%	6	3	0
5- 9%	7	2	3
10-14%	6	3	5
15-19%	3	3	3
20-25%	0	5	5
Over 25%	0	6	6
Total	22	22	22

By χ^2 test differences were significant beyond the .05 level.

Whereas Table 3 displays the means of various thinking processes in terms of percentages in each group, Table 4 displays the data classified under divergent thinking such as to show the distribution of classrooms exhibiting various amounts of divergent thinking. Table 4 indicates the number of analyses falling within various ranges of divergent thinking percentages, and thus indicates the frequency distribution which gave rise to the divergent thinking results shown in Table 3. The trend is toward larger percentages of divergent thinking as the year progressed. In October, thirteen of the classrooms, over half, exhibited less than 10% of time spent in divergent thinking processes, whereas in July half of the classrooms spent more than one-fifth of their time in divergent thinking.

Results: IMPACT Versus Non-IMPACT

Tables 5 through 8 summarize interaction analyses on the larger May 1968, sample contrasting classroom behavior when IMPACT teachers are in charge with those with non-IMPACT leadership. Each of these tables is based on analyses of 108 IMPACT classrooms, 114 non-IMPACT classrooms and on 120 observations per interaction analysis.

Tables 5 through 8 are similar to Tables 1 through 4 in terms of format and types of data displayed. The latter four tables show data on the larger IMPACT versus non-IMPACT sample concerning the same variables and in a similar manner to that used in the first four tables on the smaller study over time. In this way data from Table 1 can be compared to that in Table 5; Table 2 to Table 6, etc.

Again Chi square tests were applied to the data shown in Tables 5 through 8.

An important difference between the two sets of tables should be noted however. Whereas the first four concern a longitudinal study, that is of the same subjects over time, the latter group concerns a much larger cross sectional study involving only one recorded sample from each classroom studied, and does not follow these students and teachers over time.

Table 5

IMPACT Versus Non-IMPACT
Percent of Time During Which Teachers and Pupils Talk

	Teacher Talking		Pupil Talking	
	May, 1968	April, 1969	May, 1968	April, 1969
IMPACT	60.7%	50.2%	39.3%	49.8%
Non-IMPACT	71.2%		28.8%	

By χ^2 test differences were significant beyond the .05 level.

Table 5 expresses the means of percentages of time during which teachers talk, whereas Table 6 shows the frequency distribution of those 222 classrooms which produced the means in Table 5. It is apparent that there are only 47 IMPACT classrooms in which the teacher talks more than 60% of the time, while there are 60 such classrooms in the non-IMPACT sample.

Table 6

IMPACT Versus Non-IMPACT
Number of Interaction Analyses Showing Percent of Time Teachers Talk

Percent of Observations Teachers Talking	IMPACT May, 1968	April, 1969	Non-IMPACT May, 1969
0-19 %	8	3	6
20-39	10	4	20
40-59	43	9	28
60-79	36	14	42
80-100	11	6	18
Total	108	36	114

By χ^2 test differences were significant beyond the .05 level.

Table 7

IMPACT Versus Non-IMPACT

Percent of Time Spent in Various Thinking Processes in 222 Classrooms

	Memory and Cogniton	Convergent	Divergent	Evaluative	Routine
IMPACT--May, 1968	15.3%	26.6%	16.2%	14.5%	27.4%
IMPACT--April, 1969	6.7	24.3	23.8	22.4	22.8
Non-IMPACT--May, 1968	13.6	21.7	12.2	11.3	41.2

By χ^2 test differences were significant beyond the .05 level.

Percent of Time Spent When Routine Category is Excluded

IMPACT--May, 1968	21.0%	38.0%	20.9%	20.1%
IMPACT--April, 1969	18.2	29.4	26.7	25.7
Non-IMPACT--May, 1968	23.1	36.9	20.8	17.2

By χ^2 test differences were not significant at the .05 level.

Table 7 displays the proportion of time spent in the 222 classrooms during which the various thinking processes were exhibited and time spent in non-thinking activities. Data in Table 7 are perhaps the most unexpected and consequently most interesting. The unusual finding was the large difference in the amount of non-thinking time in the two groups, the non-IMPACT group having more than 40% of its time spent in routine activities, more than one-third more time than that found in IMPACT classrooms.

It was of interest to know just how the remaining 60% of time in non-IMPACT classrooms was spent; therefore the lower portion of Table 7 displays the proportions of time spent in various thinking processes when routine time was excluded. When actual thinking processes were occurring there was very little difference in the proportion of different thinking processes exhibited in IMPACT versus non-IMPACT classrooms.

Several hypotheses for these phenomena have been advanced.

Whatever the reasons, it was of interest to realize that intensive training directed in one direction could produce results of such a different nature.

The difference between percentages of thinking processes shown in the lower portion of Table 7 constitutes the only non-significant statistical result of the entire study.

However, the difference in total amounts of divergent thinking, when routine time is considered, shown in the top half of Table 7, is significant at the .05 level.

Table 8

IMPACT Versus Non-IMPACT
Number of Interaction Analyses Showing Percent of Time Spent in Divergent Thinking

Percent of Observations of Divergent Thinking	IMPACT May, 1968	April, 1969	Non-IMPACT May, 1968
0- 4%	6	4	26
5- 9%	15	4	37
10-14%	47	8	33
15-19%	29	11	12
Over 20%	11	9	6
Total	108	36	114

By χ^2 test differences were significant beyond the .05 level.

Table 8 shows the frequency distribution of the data from the top half of Table 7, showing the number of classrooms exhibiting various percentages of divergent thinking. The table clearly shows the consistently greater number of classrooms in the IMPACT group exhibiting higher percentages of divergent thinking, with non-IMPACT classrooms tending to have lower percentages.

Reliability of Results

Inter-analyst reliability. The great majority of the interaction analyses performed, those making up the IMPACT versus non IMPACT portion of the study, involved the same three trained interaction analysts working from the audio tape recordings. Based on an N of 222 segments of classroom behavior, the inter-analyst reliability coefficients obtained were as follows:

Coefficient of Reliability		On Percent of Teacher Talking			On Percent of Divergent Thinking		
(Average of A with B, B with C, A with C)	May, 1968	.991	.989	.987	.906	.923	.897
	April, 1969	.976	.992	.968	.912	.926	.892

Inter-method reliability. For a small portion of the interaction analyses performed (those making up the July, 1968 portion of the study over time) three different methods of data collection were employed simultaneously, then subsequently analyzed: (1) audio tape recordings, (2) video tape recordings, and (3) direct observer tallies made in the classroom. Based on an N of 22 segments of classroom behavior the inter-method reliability coefficients obtained were as follows:

Coefficients of Reliability Comparing	On Percent of Teacher Talking	On Percent of Divergent Thinking
audio with video	.963	.984
audio with direct observation	.897	.882
video with direct observation	.902	.897

Data for each of the three methods used on the calculation of inter-method reliability are the mean of the results from the three interaction analysts.

The reliability coefficients suggest that it was easy to determine whether student or teacher was talking, even in secondary schools where teachers and students voices sound more alike. It was also relatively simple to determine which responses represented divergent thinking. Shorter training periods would have almost certainly resulted in lower reliability coefficients.

Conclusions

In what ways, if any, has Project IMPACT changed the classroom experience of children in Polk County, Iowa? Just what conclusions are valid in the light of research results reported here?

Three major conclusions arise suggesting that highly significant changes have occurred in three basic areas of classroom behavior.

(1) The important pattern concerning the amounts of student and teacher participation was consistently different in the classrooms in which teachers had IMPACT training versus those without exposure to IMPACT training. Starting with the first measures in the longitudinal study and continuing throughout the year, the data showed a consistent increase in the amount of student participation accompanied by less and less teacher control, as amount of training in IMPACT increased. Also, there were highly significant differences between IMPACT teachers versus the matched comparison group on the percentages of "pupil talking" and "teacher talking" time.

Why should teachers who have been involved in IMPACT programs concerning ways to encourage creativity change so greatly the proportion of time in which they and their students talk? When asked this question on an informal assessment measure, teachers replied they were convinced that the opportunity to express ideas and participate freely in class was basic to the encouragement of divergent thinking. Therefore they had become more willing to let students express, develop, and evaluate their ideas with less teacher direction and control. More than 75% of the teachers reported that change in philosophy was the reason for such differences rather than change in methods or techniques.

(2) The amount of time spent on routine or non-thinking activities was significantly different in classrooms of teachers who had IMPACT training. The percentage of a class day spent on routine activities decreased in direct proportion to the length of time teachers had been involved in IMPACT's programs. Not only was this finding evident in classrooms of the teachers assessed over time on three measures throughout the year, but was also a highly significant finding when classrooms with IMPACT teachers in charge were compared with the matched sample of non-IMPACT classrooms.

Why would an inservice teacher education program designed to encourage creativity change a basic teaching-learning pattern involving the proportion of thinking activities versus routine classroom management affairs built up in most classrooms over a period of years? The conclusion formed from subjective self reports of both teachers and students was that as involvement with ideas increased, intrinsic interest in the subject matter under discussion pushed aside ordinary routine matters in much the manner a detail or interruption is ignored when more absorbing and interesting business is at hand. Over 80% of IMPACT teachers reported that routine

2

activities were performed, but few pupils sat and waited while such duties were being accomplished. There was less need for paper monitors or book monitors or for remarks to "Settle down and start work now;" instead ideas and thinking processes started earlier and were continued while the necessary routine activities were performed. Teachers reported that the absorption or even preoccupation of children with ideas and thoughts relegated routine affairs to lesser importance. Therefore discussion and evaluation of ideas continued through the 'cleaning up' and 'putting away' time.

(3) The basic pattern establishing the proportions of a class day spent in various kinds of thinking was different in IMPACT classrooms with the magnitude of differences being in direct relation to the length of time the teacher had been involved in IMPACT's programs. When teachers were new in the Project, both they and their students spent much more time on (a) simple memory, rote learning, recall and retrieval of specific subject matter, (b) cognition, which involves simple knowing and understanding, and (c) convergent thinking processes which are aimed at arriving at one right answer. As the amount of IMPACT training increased, the amounts of divergent and evaluative thinking increased. As the year progressed, continually more class time was spent in exploring novel, unusual, or imaginative approaches, as well as in judging and evaluating ideas and alternatives. Children did more evaluative thinking in all subject areas, either using value dimensions already given or developing their own value systems.

The IMPACT versus non-IMPACT results also showed differences in patterns of thinking in the two groups. Divergent thinking and evaluative thinking were present in greater amounts in IMPACT classrooms. Because of the reduction in time used for routine activities, IMPACT classrooms spent considerably more time in total thinking processes. However, when routine time was excluded, the conclusion was that both groups spread their thinking time over various kinds of thinking in a very similar manner expecially including more divergent and evaluative thinking. This result is remarkably different from that found by researchers five years ago. Apparently, teachers are promoting multiple thinking approaches much more today than previously. Such results seem to be congruent with the relatively few recent studies examining actual thinking processes occurring in the classroom (Hutchison, 1967; Taylor, 1968). Data suggest that classroom thinking patterns have changed over the last five years.

Since IMPACT's objective was to encourage creative thinking, which involves developing divergent thinking processes, the increase in divergent thinking is understandable. The increase in evaluative thinking apparently had two causes according to teacher and student self reports: (a) greater interest in judging and weighing and novel ideas and (b) increased opportunity for students to express their own value systems on subjects outside the area of creative or imaginative ideas.

Some caution is necessary in arriving at the above conclusions. The first consideration is that the IMPACT and the comparison non-IMPACT sample, are not completely random. There is always the possibility that teachers selected for the Project were already more interested in creative teaching and therefore different from the comparison sample in many ways. However, the study over time adds strength and credibility to the conclusions by showing the three major changes occurring in the same teachers in greater magnitude as the year progressed.

It should be noted also that the July 1968 observations in the study over time had special characteristics because of the unusual experimental summer school situation, and should not be considered extensions of the October 1967 and May 1968 studies.

Finally, the possibility of contamination of samples is always present. In this study contamination might have occurred in two ways: (1) the non-IMPACT sample may have been subjected to some IMPACT training by teachers in the IMPACT group and (2) teachers participating in the programs may have understood the evaluation procedure better as the year progressed. IMPACT teachers, however, reported that although they were more aware of general creativity criteria as their time in IMPACT increased, they had little conception of the manner in which tape recordings were studied.

The extent that the non-IMPACT sample was contaminated by exposure to IMPACT teachers makes the differences in the two samples even more meaningful. Even with such possible contamination, differences were highly significant.

Conclusions about the Criterion

The main effort of IMPACT research to this time has been the development of criteria for creativity in the classroom. The criterion selected, as stated previously, was the proportion of creative thinking taking place in the classroom as defined by the divergent thinking classification of Guilford and as measured by the Aschner-Gallagher form of verbal interaction analysis. Evaluation of the criterion after a year's use seems most appropriate. It will be discussed from the following four viewpoints of construct validity, reliability, practicality, and acceptance.

Construct validity. If one assumes the structure of the intellect as developed by Guilford, and accepts his hypotheses of the relationship between creativity and divergent thinking, the criterion selected has a substantial degree of construct validity. In his later work Guilford includes some forms of evaluative and convergent thinking within his concept of creativity. A secondary operational definition was devised including a combination of these thinking processes along with the divergent thinking classification. A more complete model is needed concerning the proportions and relations of various thinking processes to creativity before this can be practical as a criterion. The divergent thinking classification nevertheless is reasonably congruent with Guilford's creativity concept, and the validity of the criterion follows if Guilford's work is accepted. There is general acceptance by researchers that the interaction analysis technique developed by Aschner and Gallagher does in fact measure the proportionate amount of divergent thinking as defined by Guilford.

Reliability. The reliability coefficients quoted are evidence that trained analysts can agree on the classification of classroom behavior into Guilford's thinking processes. Reliability is no doubt improved when the analyst has a chance to review his classification, as is possible in play back of a tape whenever he is in doubt as analysts in this study did, but even the unreviewable classification procedure arising from direct observation has reasonably good reliability characteristics.

Practicality. More than 250 half-hour interaction analyses were made in the course of the investigation with a minimum of practical difficulty. The audio tape recorder is a valuable tool for research of this type; without it practical difficulties might have been too difficult to overcome. The audio tape method appears to be superior to either the less reliable direct observation technique or the more complex video tape recording. Well trained analysts are a necessity, but intelligent and interested college students are clearly capable of the judgments required after a period of instruction and practice. Sufficient instruction, training, and practice is needed, however, if reliable data are to be recorded. A researcher can expect some difficulty with unintelligible portions of tapes, but this can be solved by the use of non-directional microphones and lengthening the time of tape recordings. On unintelligible portions the substitution of the next intelligible segment for the unintelligible part appears to be a satisfactory solution.

Acceptance. In many ways the most encouraging feature in the evaluation of the criterion was its acceptance by IMPACT participants. They had become wary of the ability of checklists or paper and pencil tests to measure creativity in their classrooms. By acceptance is meant much more than the willingness of IMPACT teachers to permit tape recordings of their classrooms, though this in itself was a major victory in classroom research. Much more important, IMPACT participants, teachers with a special interest in creativity, came to believe in the criterion as realistically and satisfactorily interpretive of creativity in the classroom. Only six teachers in the entire experiment including both experimental and comparison samples requested not to have their classrooms evaluated in this manner. Reasons for acceptance of the criterion were related to (1) its objectivity, (2) its classroom orientation, and (3) the lack of an obvious test-taking situation involved. Teachers tended to be suspicious of subjective evaluations as to what may or may not be creative, such as of judgments of persons or products; they also preferred to avoid paper and pencil tests which they see as having doubtful validity in appraising creativity in the classroom.

Those working with Project IMPACT are satisfied that the criterion selected will serve IMPACT's purposes, even though all concerned recognize that the general criterion problem which has always plagued creativity research remains unsolved. Research plans for IMPACT include continued use of the divergent thinking criterion as a measure of creativity in the classroom, and as a base or yardstick against which other measures can be judged.

Future Studies

The entire IMPACT and non-IMPACT sample will be re-evaluated using the interaction analysis procedure in May, 1969, as a part of planned research providing more longitudinal data as well as a measure of the effectiveness of two years exposure to IMPACT training. Classrooms of teachers who joined the Project in September, 1968, were assessed in December, 1968, to provide base measure on the new participants, such data to be used in future longitudinal studies.

Over the year a data bank was developed for storing information collected in the Project's various investigations. A master card which contains data such as identification and personal biographical information followed by an array of cards containing data collected from specific investigations is maintained for each teacher and administrator in the Project, as well as each teacher and administrator in the matched comparison sample.

A similar array of card data has been developed for each student included in the investigation, though the student sample is not a total of all students of the Project's teachers.

The third file of cards provides a similar system for storing information collected on schools. Obviously cross reference use of data from teacher and student files is possible. Interest in storing data by schools evolved from ongoing studies on the organizational climate of a school and its effect on creative behavior (1) of teachers, (2) of students, (3) in classrooms. Here the school is the unit, rather than teacher, student, or class.

A small study specifically related to the criterion measure is currently in process. It concerns interaction analyses data from tape recordings made on groups of four students working together without a teacher in a situation as open and unstructured as possible. Each individual child's responses were recorded separately rather as a class. Sub-classifications of divergent thinking also were recorded: fluency, flexibility, originality, and elaboration. Since the same four factors are scored on Torrances's Tests of Creative Thinking Abilities, results of each child on the above four factors from interaction analysis data and from Torrance's Tests will be correlated. Both instruments attempt to measure Guilford's sub-classifications of divergent thinking.

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APPENDIX II: RATIONALE FOR SELF-CONCEPT STUDIES

Rationale for Self-Concept Studies

During the nearly two years in which I have served as research director for Project IMPACT there has been increasing interest in education circles in efforts to measure attitudes, particularly the body of attitudes most closely related to a person's self-concept and self-esteem, his feeling of worth as an individual.

Several factors have contributed to this increasing interest in attitudes toward oneself, particularly findings of current research. When research studies began to produce conclusive evidence of the importance of student attitudes in determining academic achievement, interest in measurement of attitudes and in ways of modifying them increased. Scholastic achievement has always been, rightly or not, the major criterion measure of American education. Anything correlated to it causes interest.

In the past few years there have been a number of important large scale surveys of research studies which have had a major influence on the education world, and are beginning to have an influence on the public. These surveys point out the importance of self-concept in relation to a pupil's school performance, and also show the failure of approaches ignoring attitudes.

Moreover these surveys and other research information have created a marked change in government funding. There is an increasing acceptance of proposals for educational programs which are related to self-concept, self-pride, self-confidence, and general feeling of worth. This trend is especially noticeable in 1968 funding.

In order to design the most fruitful hypotheses for studies of those attitudes which make up self-concept, it seems valuable to search for the ideas in these surveys which suggest directions for future research.

Let us consider those ideas that tie together the findings of the different nationwide surveys of educational experiments which have been so vital to education in the last three years.

Perhaps the most appropriate survey to discuss first is the James S. Coleman (et.al.) Report, "Equality of Educational Opportunity," 1966; Dept. of Health, Education and Welfare, Washington, D. C. The findings of this report are substantiated by statistical data which comprise the largest survey of education ever conducted (National Center for Educational Innovation Reporter. 225 West University Drive, Tempe, Arizona, 1969).

The Coleman Report summarizes a nationwide study of education achievement which includes assessments of all the known major environmental and socio-economic variables. The essence of the Report is that academic achievement is more highly correlated with attitudes of students than with any other variable or combinations of variables previously considered to be important in academic achievement--such as curricula, class size, socio-economic class, parents' education, parents' interest in child's school work, structural integrity of the home, preschool attendance, geographical region, teacher salaries, or school facilities.

Coleman's report identifies the following attitudes as most crucial: those involved in (1) the student's self-concept, (2) his belief in control over his life, and (3) his sense of the relevance of school for him. Coleman's findings suggest that educators must place increased emphasis on forming constructive attitudes by (1) building curricula which meet the objectives of students, (2) encouraging student involvement and participation in school, and (3) actively seeking other ways in which feelings of self-concept and self-worth may be enhanced.

The Coleman Study findings are thus particularly relevant to this rationale for proposed studies of attitudes of self; in fact, his thesis is that the area of student attitudes deserves the greatest concern if we are to achieve "Equality of Educational Opportunity."

The second large survey of education which has relevance for this rationale is really a body of surveys, those reviewing the effectiveness of projects funded under Title I ESEA, the 1965 U. S. Government legislation for remedying the low scholastic achievement of "culturally disadvantaged" children. One of the major surveys of Title I programs was that done by the U.S. Commission on Civil Rights, 1967 ("Racial isolation in public schools". Vol. 1 Washington D.C., U.S. Government Printing Office).

The Civil Rights Commission survey as well as several other large scale reviews of projects funded under Title I all suggest widespread failure of these programs designed to remedy low educational achievement of disadvantaged children. The U.S. Commission on Civil Rights which surveyed programs in "majority-negro" schools, states: "A principal objective of each was to raise the academic achievement of disadvantaged children. Judged by this standard the programs did not show evidence of much success." (p. 138). Kenneth Clark gives a similar report in his book, Dark Ghetto (1968).

Some of the largest programs of compensatory education such as the five-year Higher Horizons project in New York City, the three-year project entitled More Effective Schools in New York, the Banneker Project in St. Louis, and other projects in Philadelphia, Los Angeles, Seattle, and Berkeley which were considered model programs and employed a variety of educational approaches also showed no significant difference in the academic achievement of their disadvantaged children.

Failure of Title I ESEA "Compensatory Education" has been caused in part, suggest an increasing number of educators,(*NCEI Reporter*, February, 1969; *Legislative Recommendations in Education* by tne new Commissioner of Education, Dr. James E. Allen, March, 1969; HEW's *Report* by Assistant Secretary of HEW, Dr. James Farmer, March 1969)by a failure to include in the programs some emphasis on improving a student's feelings of self worth. Farmer is particularly emphatic in his concern for government support for effecting "changes in student attitudes in urban schools."

The next survey which has relevance for this rationale is an inventory made by the U. S. Office of Education outlining the programs administered by USOE in the fiscal year, 1969 (1968-69). This comprises the entire February 1969 issue of *American Education*, or can be ordered from the U. S. Government Printing Office, Washington D. C., Document OE-11015-69. Another survey, a continuing one which has been in existence for some time and which gives abstracts of the programs funded by USOE is the ERIC Reports. Both the 1969 Fiscal Year Inventory and the Eric Reports show an increasing trend toward funding of programs which attempt to change or modify attitudes of school children toward themselves.

Considering the overwhelming effect which USOE has had in setting directions of educational research especially since 1965, their encouragement of attitude research probably will considerably increase studies in this area.

In addition to the three above mentioned large scale surveys of studies in the field of education, there are two current highly publicized investigations which have special pertinence to any study of attitudes toward the self.

The Rosenthal and Jacobson experiments reported in *Pygmalion in the Classroom*. New York: Holt, Rinehart, and Winston, 1968. This study, and other similar investigations often referred to as "expectancy gain" studies, suggest that a teacher's expectation of a child's scholastic performance is highly important in determining the level of performance the child reaches. The expectancy gain experiments suggest that a teacher's expectation of a child's performance acts as a self-fulfilling prophecy. The concept that children perform in school according to their teacher's expectations of their performance, a notion accepted for some time by educators is now gaining in public acceptance.

The notion that children perform at a level congruent with their *own* expectations is one which has been established through considerable research. The child's expectance of his scholastic performance is determined by attitudes related to his self concept, and is probably determined to some extent by his teacher's expectation of his scholastic performance. A part of a child's self concept is the way his teacher views him; the extent to which the teacher's attitudes effect this self concept is one area I wish to study.

Another highly publicized current investigation which has relevance for the study of student attitudes is the Arthur R. Jensen article in the winter 1969 issue of Harvard Education Review. This controversial study takes the position that, with the failure of compensatory education programs to raise scholastic achievement, basic assumptions underlying present approaches need to be examined. Jensen's thesis is that new educational approaches are needed which are more appropriate for mental abilities and emotional make-up of children in the lower socio-economic classes.

Jensen's article reviews recent findings on the very diverse patterns of mental abilities which have been found in various ethnic and socio-economic class groups. Jensen argues that the failure of massive compensatory programs to produce appreciable gains in achievement is inadequately explained by environmental causes and is due largely to the inheritance of different mental abilities in various social classes. The relation of attitudes to scholastic achievement is not emphasized by Jensen, except in the need for a diversity of educational approaches, which consider both cognitive and affective learning, is. Change in the approaches which affect learning of attitudes towards oneself is a basic need.

In summary, we find considerable research evidence that academic performance is highly correlated with student attitudes. Moreover, self concept studies of the past have established a positive correlation between a child's self concept and his performance outside of school (Stanley Coopersmith, The Antecedents of Self Esteem, 1967; Ruth Wylie, The Self Concept, 1961).

The suggested studies hope to extend our knowledge concerning certain factors in schools and in teachers which affect the attitudes of a child about his self. Even the question of the amount to which a child's self concept is similar to that of his teacher (and how much is formed by his teacher) is an unanswered question. Considering the significance of a favorable attitude toward oneself in terms of personal satisfaction and effective functioning beyond school achievement, it is disconcerting that so little is known about attitude development.

The proposed self concept studies explore the following aspects of self concept attitudes in children and their teachers.

(1) self concept of a teacher and the amount of divergent thinking expressed in her classroom,
(2) self concept of a teacher and the "mean" self concept of pupils in her class, i.e. the amount to which a teacher's self-concept is reflected in that expressed by her pupils,
(3) the effect of social class (SES, socio economic status on self concept of children)
(4) differences in self concept with age: lower elementary versus upper elementary,

(5) differences in the self concept of teachers who have participated in IMPACT training (designed to encourage creativity in teaching) for two years versus teachers just now entering the Project,

(6) differences in the self concept of pupils whose teachers have had two years of IMPACT training versus children whose teachers have not,

(7) differences in correlation between self concept of a teacher and that of her pupils in classes which have had the same teacher for two years versus one year.

Self concept of teachers as reflected in self concept of their pupils

Purpose:

(1) to determine if there is any similarity between the self concept of elementary school teachers and their pupils in a contained classroom situation;

(2) to determine if any greater similarity exists when teachers have had the same pupils for two consecutive years.

Subjects:

(1) 40 self-contained elementary school classes in Polk County which have had the same teacher for one year;

(2) as many elementary school classes in Polk County which have had the same teacher for two years as possible, at least 20.

Method:

Administer the _Tennessee Self Concept Scale_ to the teachers.

Administer the Stanley Coopersmith's _Inventory of Self Esteem_ to the pupils omitting any who have the same teacher because of being retained.

Analysis:

(1) For the forty classes in (1) correlate the total self concept score of a teacher with the _mean_ self concept score of her pupils.

(2) For the twenty classes in (2) make a similar correlation. Test whether the difference of the two correlations is significant.

Hypotheses:

The self concept of the elementary school teacher is reflected in her pupils; that is, there is a correlation significantly greater than zero between the mean self concept score of a class and the self concept score of its teacher.

There is a higher correlation for classes which have had the same teacher for two years for classes which have had a teacher only one year.

Self concept of elementary school children of different ages, socio economic class, and training of teachers

Purpose:

to determine if there are significant differences in the self concept of elementary school children--(1) by age (lower elementary, second and third grade, versus upper elementary, fifth and sixth grade); (2) by socio economic class (lowest income urban schools in Des Moines versus middle class suburban schools; (3) by training of teachers (those having received training from IMPACT for two years versus teachers without this training; training by IMPACT is oriented toward encouragement of creativity in teaching.)

Research Design:

2 X 2 X 2 X 5 analysis of variance

Age X Social class X Training of teachers X 5 classes = 40 classes

Subjects:

Children from forty classrooms in Polk County, Iowa, five classes each meeting the following requirements producing about 150-170 children in each "cell".

AGE	Lower Elementary	Low Social Class	IMPACT Training
			No IMPACT Training
		Middle Class	IMPACT Training
			No IMPACT Training
	Upper Elementary	Low Social Class	IMPACT Training
			No IMPACT Training
		Middle Class	IMPACT Training
			No IMPACT Training

Method:

Administer Coopersmith's Inventory of Self Esteem to all children in the sample, approximately 150 X 8 = Total N of 1200

Analysis:

analysis of variance on three variables and their interactions.

Hypothesis:

the self concept of elementary school children differs significantly by socio economic class, training of teachers, but not by age.

Certain attitudes which make up self concept, measurable on the Coopersmith's Inventory, will differ significantly by age. This will be accomplished by a search for items and areas which show large differences by age, which might suggest future hypotheses.

Relation of self concept of teachers to a classroom creativity criterion measure

Purposes:

1. to determine the relation between self concept of teachers and a classroom creativity criterion measure, the kinds and proportions of various thinking processes used in the classroom.
2. to compare the self concept scores of elementary versus secondary teachers.
3. to compare the kinds and proportions of thinking processes in elementary versus secondary classrooms.

Subjects:

Approximately 60 elementary and secondary teachers in Polk County, Iowa in whose classrooms audio tapes have been collected over a two year period under the research program of Project IMPACT.

Method:

From analyses of the audio tapes, varying from two to four from each classroom, the proportions of time each teacher and her pupils spent in various thinking processes was established. Teacher and pupil time was recorded separately. This analysis was performed using the Aschner-Gallagher verbal interaction technique which classifies responses into one of Guilford's five classifications of thinking processes: memory, cognition, convergent thinking, divergent thinking, and evaluative thinking, as well as recording time spent in non-thinking activities.

Collect data on the self concept of the 60 teachers using the Tennessee Self Concept Scale which provides a total score as well as the sub scores indicated below. Sub scores are found for each "box" as well as row and column totals.

	Physical Self	Moral-ethical Self	Personal Self	Family Self	Social Self	Self Criticism	Total
Identity What he is							
Self satisfaction how he accepts himself							
Behavior how he acts							
Total							

Analysis:

(1) Correlate the percentages of classroom time spent in various thinking processes with the teacher's total self concept score. Correlations with sub-scores of the self concept scale could be done.

(2) Compare self concept scores of elementary versus secondary teachers.

(3) Compare proportion of classroom time elementary and secondary teachers spend in divergent and evaluative thinking processes.

Hypotheses:

Teachers who have higher self concept scores use more divergent thinking in their classrooms.

Teachers having lower self concept scores use more memory, cognition, and convergent thinking in their classrooms.

Elementary and seconary school teachers do not differ significantly in self concept. If this hypothesis is not substantiated by the data, I could search for the sub scales in which differences exist.

Self Concept of Teachers and Their Out-of-School Accomplishments

Purpose:

to explore the relationship between the self concept of teachers and their tendency for out-of-school accomplishments.

Subjects:

Approximately 60 elementary and secondary school teachers in Polk County, Iowa who have been participants in Project IMPACT for two years.

Method:

Administer Tennessee Self Concept Scale to all subjects.

Develop a shortened form of ACT's Survey of Educational Status and Progress which would be appropriate for assessing a teachers' out-of-school accomplishments. Administer this instrument to all subjects.

Analysis:

Correlate total self concept score of teachers with total score on out-of-school accomplishments.

Hypothesis:

Teachers with higher self concept scores tend to have more out-of-school accomplishments.

(The positive self concept may encourage the teacher to participate in outside activities and subsequently achieve in some areas, or the out-of-school accomplishments may serve to build and strengthen the self-concept. This would not prove cause, of course.)

ED033906

IMPACT

REPORT

1969

FOREWORD.

This report has been prepared as an unofficial account of the development of Project IMPACT during its first year of existence.

IMPACT is an inservice education project of the Polk County Board of Education

Des Moines, Iowa
September, 1968

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INTRODUCTION

Project IMPACT's major thrust evolves from two key educational concerns: (1) the need to "humanize" the process of education and (2) the need to develop innovative teaching methods which will aid productive thinking and minimize the old reliance on rote-learning ■ Through IMPACT's inservice education program, these two concerns have been integrated by emphasizing the idea that teachers should accept each student as a "thinking being" rather than as an empty receptical waiting to be filled with knowledge. IMPACT encourages teachers to communicate with students as fellow seekers of knowledge and to strive with them to explore the mysteries of human existence ■ To help students develop the tools they need to carry out this exploration, IMPACT encourages teachers to use teaching methods which transcend simple recall and memory. Recent research indicates a giant void in our educational system in the development of creative, evaluative and independent thinking. For too long we have asked students to learn the "right" answers to what may not even be the right questions. IMPACT means to change that ■ In this IMPACT Report, we have attempted to outline for you our efforts toward this change. Particular attention is paid to the work done during IMPACT's six-week summer institute, held at Southeast Polk Junior-Senior High School in June and July, 1968.

Bill M. Clark

Bill M. Clark
Director

CHRONOLOGY

During the 1963-64 school year, Ralph Norris, Superintendent of the Polk County Board of Education, and members of his staff met individually with the nine district superintendents in the county, principals of county schools and curriculum-development personnel. The purpose of these meetings was to discuss the apparent lack of creativity in the teaching techniques used in classrooms, both in Polk County and in the nation. At the conclusion of this series of meetings, Mr. Norris drew up a statement which summarizes the group's findings. The condensation of that 1964 statement which follows gives a good indication of how the idea of IMPACT was conceived:

The American public school system has historically emphasized the education of the academically gifted student who learns by studying the meanings of printed symbols and is able to retain and recall them as needed. Furthermore, the great emphasis on the physical sciences in the aftermath of SPUTNIK-I and the heavy-handed criticisms issued by men like Hyman Rickover and Rodger Freeman has merely pushed the system further in this rote-learning direction. Federal grants for science teaching helped reinforce this push.

Still another strong, if subtle, influence on educational policy has been competitive testing for scholarships and entrance to college. These testing programs were designed to find all the "high achievers" who can retain and recall on a superior level.

Taken alone, there is nothing wrong with teaching and encouraging children to memorize and recall. When the whole educational system is based primarily on this single skill, however, the question of balance must be raised.

Fortunately, a time of trouble has the advantage of also being a time of opportunity, and the recent interest in education has an inherent value which can be channeled in a new direction. In the long run, the direction chosen must be toward a philosophy which will meet the educational needs of all children and encourage creativity.

Creativity is not really a new subject. Lewis Terman at Stanford University, for example, has been conducting psychological research in creativity for more than 30 years. Another psychologist, J.P. Guilford, has demonstaated that human intelligence is comprised of at least 90 different kinds of abilities. Calvin Taylor of the University of Utah has indicated that creative people may be strongest in abilities not measured by present IQ tests. Furthermore, Taylor has shown that current school grading systems, since they are based on similarly limited measures, "put a straight-jacket around the creative child."

Other researchers have found that the creative child might feel quite alienated in the conventional, quiet, well-ordered classroom. Among other things, the creative child tends to thrive on disorder, have a strong ego, be more psychologically troubled, introverted and intuitive. He also tends to be of high intelligence (although not necessarily above 120 IQ), wilful, self-assertive, aggressive, tactless, impatient, impulsive and unstable. He tends to enjoy difficult and dangerous tasks and to search constantly for a purpose. Most of all, if he follows in his creative forebears' footsteps, he will produce more innovative ideas in his lifetime than his less-creative peers.

Obviously, if creativity is to be added to the goals of the educational system, classrooms and teaching methods must change. The question is, of course, *how* should they change?

First, since psychologists have found that the early, formative, years are most important in determining a child's personality, a program of adult education for parents and prospective parents should be instituted in the school districts.

More immediately, teachers and administrators should review current literature in the field of creativity. Volunteer teachers should be encouraged to try some of the new methods that literature suggests, allowing plenty of time (at least a year) for them to develop their skills. Parents and others interested in education should be kept informed of developments. Finally, a program of in-service education for teachers and staff personnel should be developed. ○

While Norris and the other educators in Polk County were holding their discussions, similar concerns were being expressed in congressional committee rooms by the nation's leading educators. The result of this expression was the inclusion of "Title III" in the Elementary and Secondary Education Act which came into effect in 1965.

Title III made federal grants available to local education agencies for projects stressing creativity and innovation. Furthermore, the U.S. Office of Education immediately instituted a program called PACE (Projects to Advance Creativity in Education) to encourage local school boards to take advantage of the Title III funds.

Shortly thereafter, planning began for development of a Title III project in Polk County to provide in-service creativity training for teachers. Bill Clark, a graduate student at Iowa State University serving as an intern in the Polk County Office at the time, was assigned the task of coordinating development of the project. Advising Clark were Ralph Jorgensen, Director of General Education and Janice Smith, Music Coordinator, both of whom were highly interested in the field of creativity development.

In addition, Dr. Norma Trowbridge of the Drake University College of Education and Dr. Joe Shea of the Department of Child Development at Iowa State University (and now at the University of Florida) volunteered to act as consultants.

Following the PACE guidelines, a plan was developed for a project to be called IMPACT (for Innovation and Motivation in Polk County for the Advancement of Creative Teaching). By the fall of 1966, the project was defined enough to send a tentative copy of the IMPACT proposal to the four universities in Iowa and to superintendents throughout Polk County, asking for comments and criticisms. The proposal was re-written on the basis of the responses to this tentative proposal and submitted to the U.S. Office of Education in January, 1967.

A "pre-approval conference" was held at a 4-H camp near Luther, Iowa in the spring, involving about 40 interested teachers from Polk County. During this two-day conference, the teachers were familiarized with the proposed project. Most of these teachers later joined IMPACT as participants, and some of them were selected to be members of an IMPACT advisory committee.

In June, 1967, another workshop was conducted by the Child Development Department of Iowa State University, directed by Dr. Shea and featuring Dr. Calvin Taylor of Utah and Dr. Frank Williams of Macalester College in St. Paul, Minn.

In the meantime, a conference with a U.S. Office of Education representative had secured tentative acceptance of the IMPACT budget. Confident that the project would become a reality, Clark, Jorgensen and Helen Coe, who had left a teaching position at Iowa State to join the project as Assistant Director, attended a creativity workshop conducted by Dr. Taylor at the University of Utah. During this workshop, Taylor recommended Dr. Elwin Nielsen, staff psychologist for Salt Lake's Granite School District, to be director of project IMPACT. After Dr. Nielsen was interviewed by a committee of Polk County educators, he in fact became IMPACT's director in August, 1967. He remained in the post for one year and was relieved as director by Clark, who had completed his doctoral work in the meantime.

In mid-July, IMPACT was officially funded, and the first regular workshop was held in August, in line with the original IMPACT proposal, which provided for a series of workshops (phase I) followed by a summer institute (phase II).

Eighty-five teachers attended the first workshop, and became permanent IMPACT teachers at that time. Cal Taylor and his Utah "task force" led off by demonstrating various techniques of creative teaching, stimulation of productive thinking and the uses of instructional media. Frank Williams and others teamed up to introduce various techniques of producing "ideational fluency."

The first workshop was a successful one and was followed by a series of similar workshops. In November, Dr. Richard Suchman of Science Research Associates demonstrated his "inquiry development training" techniques, using a group of Ankeny, Iowa children as subjects. Suchman returned for a one-day luncheon-conference with the IMPACT teachers in January, 1968. The next month, Dr. S. I. Hayakawa, editor and founder of the semantics journal *ETC,* related his ideas on creative writing and teaching techniques to still another workshop.

A "leadership cadre" of 30 teachers was selected in March, and they were trained at a two-day workshop in April to act as leaders of discussion groups. A team of specialists from the Cleveland Heights (Ohio) school district were called in to direct this training.

That same month, another workshop was held at the Des Moines YMCA to plan the summer institute. A curriculum for the institute was designed and teaching teams were established. In addition, 35 new teachers joined IMPACT. With that final workshop, planning began for IMPACT's phase II, a solid six weeks of training in the theory and practice of creative educational methods. It was to be an auspicious gathering of some of the best talent in Polk County schools together with authorities of national renown for the single purpose of developing innovative teaching and learning methods.

What follows is an examination of the IMPACT summer institute. The philosophical inputs, the innovative reactions to those inputs and the long-term programs planned by IMPACT teachers will each be examined. ◘

PHILOSOPHY

Calvin W. Taylor, J. Richard Suchman and Frank E. Williams are among the most profound thinkers in the field of creative teaching and learning. Each has a distinct approach to the subject, but the approaches are complimentary and so the ideas of all three can be adopted and adapted for use in the classroom.

The IMPACT teachers had an opportunity to work with these men during the summer institute, as they had individually during earlier workshops. No attempt will be made here to record all the information exchanged during the lectures and demonstration these "philosophers" presented, but a feel for the basic philosophy of each might be gained by reading the following capsules.

CALVIN W. TAYLOR:

Research conducted over the last thirty years has shown that there are many types of giftedness other than the commonly accepted "academic" giftedness. Creative talents, communication talents, planning talents and decision-making talents, for example, are known to exist. Furthermore, those who are high-achievers in one of these talent areas may be only average or even low in another.

Conversely, those students whom we have been classifying as "slow learners" or "below average" may actually be at the top of the totem-pole if our standard were designed to measure talents other than the academic.

This suggests that actually almost all of the students in a given classroom are "above average" if all of the talent-areas are taken into consideration. It suggests also that a talent search must be carried out by the teacher in the classroom to discover in which talent-area each student excels.

A multiple-talent approach to education would provide a framework for designing curricula which would reach those not being properly developed by our present academic programs. We propose to do this by adopting a more student-centered focus. This focus would concentrate on what is being *learned* by the student rather than what is being imparted by the teacher.

Students would be allowed to develop their talents while they grow in knowledge. They would exercise and develop all of the known intellectual abilities as their minds feed upon, toy with and otherwise process and utilize current knowledge. The unique and fascinating role for the teacher in all this is that he becomes a talent-developer by learning how to have students use each kind of thinking and learning process at one time or another in the curriculum.

What this means is that the acquisition of knowledge, rather than being the central focus becomes, instead, a by-product. In fact, the evidence shows that students will actually grow more in knowledge of subject matter when this approach is used.

Now obviously not every teacher can be highly skilled in development of *all* talent areas. It would seem wise, therefore, to have different teachers specialize in different teaching methods and become expert in developing *particular* talents. One teacher could concentrate on development of divergent-productive thinking to help those students who rank high in creativity, for example. Another could specialize in leadership training for those who have more decision-making talent.

Our multiple-talent approach does not call, then, for all talents in all students to be developed simultaneously. But it does call for every learning and thinking process to be developed at some time during the course of the total curriculum.

In this way, we will identify and develop a much higher percentage of the human resources of the students in our classrooms. And we *must* do this if we want students to be not merely learners but also thinkers; not only memorizers and imitators but also searchers and innovators; not merely scholars of past knowledge but also producers of new knowledge.

J. RICHARD SUCHMAN:

Too often we speak in terms of what a student does instead of *how* or *why* he does it. We have not developed a precise language-of-education to systematically describe and analyze the internal functions going on within the learner.

Much of the confusion about "discovery learning," for example, seems to stem from a too-external view of learning. We have difficulty seeing the difference between the process going on when children theorize from data they themselves collect (which is genuine inquiry) and that occurring when children simply try to "discover" the "correct" interpretation of the facts the teacher gives them. Externally, the two processes appear very similar.

Knowledge we have already stored greatly affects the way we perceive the world outside ourselves. An experienced weatherman notices more about the sky's appearance than do most of us. A skillful teacher is more alert to individual differences in students than is the average person. We do not use our senses, then, as wide-open windows, allowing everything to enter —we are selective, and our selection is based largely on what we already have internalized.

Perception is a series of contacts, each ocurring at a given time and space, between man and his environment. We may call these contacts *encounters*. Each encounter has a certain level of intensity, depending upon how many encounters the environment offers and the prior knowledge the person uses to organize the encounters and make them meaningful.

The encounter, then, is not meaningful in and of itself, but must be extracted. This extraction is accomplished by the *organizer*, which is a particular condition of the mind that permits the learner to respond to encounters in selected ways. Developing this condition of the mind, of course, is a long-term project, but it is evident that if the teacher desires to increase the quantity and quality of a student's encounters, he should surround the child with more "stuff" and give him a chance to get at it.

An important first step in entering a new field of study is a period of unstructured familiarization, a time for "messing around" to get the feel of things. This will result in the storing up of a wide range of encounters to be used as organizers for the future pursuit of more formal and structured knowledge. As the child builds up his store of encounters, he will accumulate a kind of intuitive knowledge that will help make subsequent encounters of the same kind more meaningful.

If we bring children close to many forms of living things, for example, and allow them to care for plants and animals, observing the conditions for survival and the processes of growth and change, we immerse them in encounters with natural phenomena. Then we can go on to introduce such formal concepts as homeostasis or photosynthesis. They already sense the meaning intuitively and are better able to interpret our formalizations.

What we call "data" are in effect discrete samplings of the environment. As one accumulates these samples, he begins to construct or to abstract beliefs, theories, generalizations or principles about the nature of things he is sampling. We call this process *inference* or inductive reasoning. We use inference to form generalizations called laws or theories.

The motivation for going through this learning process may be any one of several things. When a person's knowledge seems incomplete or inadequate to him, for example, when something puzzles him that he just can't figure out, when he wants a final, satisfying explanation for something, he is seeking "closure." He is disturbed by the open-endedness of his situation. This type of closure-motivation is quite common in children. Like most of us, they feel better about the world when all the parts seem to fit together and they can get a "handle" on it.

Curiosity can also be a motivation. It is very different from closure. It tends to open the world up —to find new problems rather than solve old ones. It gives the curious child great pleasure and satisfaction just to probe, wonder and doubt, even when this never leads to closure.

When he encounters red grass, the child who seeks closure wonders why it isn't green like all the other grass. The curious child is more likely to ask why all the other grass is green.

A third motive is power. Knowledge is power and many people pursue knowledge for that reason alone. Being able to predict and to control one's environment gives one a sense of sureness and competence.

In light of all this, it is apparent our goals in education must be modified. Traditionally, we have been concerned with shaping the child to fit the demands of society. The expectations of each individual in society are fixed before his birth. Education is to see to it that he can fulfill this role. He must learn to write, speak, add, subtract, read the proper books, sing the right songs, have the correct manners, opinions, emotional responses —and perhaps most important, reach the "right" conclusions.

The progressive movement of the 1930's was a strong reaction against this tradition. The new emphasis was on the individual and the kind of growth he could achieve in an almost totally free and permissive environment.

It should be possible to find a middle road between these "traditional" and "progressive" extremes, to help children acquire new meaning without forcing them to give up their autonomy. This new approach could involve two very fundamental learning activities: play and discussion.

Play is the earliest learning scheme for the developing human. It is a vital precondition for the more formal learning activities. Despite this, educators have long neglected play as a means of fostering intellectual growth.

We often separate things that are "play" from things that are "for real." The real things are those whose consequences will affect our life in the future. Play, on the other hand, has only very temporary significance. It is isolated from the realities that count in this world. It exists simply because it is satisfying in and of itself and not because it produces significant consequences.

This is the big advantage of play. So long as we aren't concerned about consequences, we feel free to experiment and explore, to try things without fear and with an open mind.

The child at play can create his own encounters at will and compare them with organizers he's already developed. His organizers can be tried out on the new encounters until he finds the most productive match —he infers from the data. In allowing this type of learning to take place, the teacher must overcome his fear that the children will not reach the "right" conclusions. He must allow the children to have autonomy of control —to "shift for themselves."

The second fundamental learning activity, discussion, permits the exchange of encounters and organizers to the mutual benefit of all participants. In free discussion, as in play, autonomy of control is essential. Each participant is free to give out or take in what he wishes. The forum becomes a "sounding board" for his organizers and inferences. At the same time, the teacher can observe and feed encounters into the discussion to enrich the entire process.

FRANK E. WILLIAMS:

To diverge his thoughts and create a new idea, a person draws upon stored knowledge and makes new associations. The teacher's problem is to help the child acquire a strong content-base and at the same time develop the skills of creative-divergent thinking.

No drastic changes in curriculum or teaching method are required. In fact, most innovative teachers are already implicitly solving this problem. There are, however, at least 23 teaching strategies which will aid the teacher in experimentation:

1. Use paradoxes —the inconsistencies between what people hold to be true and the way they really act. Is it really true that hard work will solve *any* problem, as the old proverb would have it?

2. Use analogies —like situations can be used to point out how new information can be derived. Radar, for example, was developed on the principles of reflected sound waves used by bats.

3. Sense deficiencies —concentrate on what man does *not* know. There are still things that bother people in this world, things they need, and things that don't work right. These problems could be solved if only man's knowledge were more complete.

4. Think about "possibles" and "probables" and formulate hypotheses. Let the children propose answers to questions such as "what if?" or "in what *other* way?"

5. Use the inquiry-training method of asking provocative questions. Not all inquiries need be strictly factual —the "how much?" type. "How would *you?*" or "How *else?*" are legitimate forms and help students to translate, interpret and extrapolate.

6. List the attributes of things. Point out inherent properties of things. Ask students to generate new uses for common things (pencils, paper clips, etc.) so they must analyze their properties.

7. Explore the mystery of things —allow the children to be "detectives," deducing facts about things or phenomena.

8. Encourage original behavior. Reward the unlikely or unexpected rather than the conventional.

9. Emphasize the importance of change. Develop the skill of changing things rather than adjusting to them.

10. Use the case-study approach in developing an organized structure which can lead to a random search for other knowledge. Organize information to a certain point, for example, then ask "what would *you* do?"

11. Teach about rigidities, fixations and habits. Show that habit-bound thinking has influenced invention. The principle of the jet plane was known in ancient China, for example.

12. Teach the skills of search —describing, comparing, contrasting—as well as controlled research in experimental situations.

13. Build a tolerance for ambiguity. Set blocks in the way of the normal learning process —allow students to be puzzled and challenged so they can move toward self-directed learning.

14. Provide opportunities for intuitive expression across all the senses. Let children dramatize their feelings and emotions, play hunches.

15. Teach the processes of invention and innovation. Teach about inventors who have combined sustained effort with original thinking.

16. Use serendipity —capitalize on unfortunate mistakes and accidents. Show that mistakes are, at least, an indication of effort.

17. Analyze the traits of persons recognized to be creative. Show how personal and social discomfort or deep concern may foster creativity.

18. Encourage thinking based on stored knowledge. Let students toy with what they already know instead of forcing them continually to absorb new information.

19. Teach cause-and-effect relationships. Allow students to examine solutions and answers in terms of their implications and consequences.

20. Develop a receptivity to unexpected responses and be alert to their significance.

21. Develop skills in reading creatively. Teach the difference between reading for information-gathering and for idea-development and inspiration.

22. Develop skills in listening creatively —listening for information which may lead to new things.

23. Emphasize simple perception as a skill —draw attention to shapes, textures, odors of things.

When these teaching strategies are used across the spectrum of subject-matter, divergent thinking is the result. Divergent thinking is defined in terms of the following measures:

Fluency —a quantitative measure of the number of questions, responses, ideas or products generated by the students.

Originality —a qualitative measure of unusual, remote or clever questions and responses.

Flexibility —a quantitative measure of the number of shifts in the production of questions, responses, ideas or products. Changes in approach or direction of thinking determine flexibility.

Elaboration —a quantitative measure of the amount of specificity and embellishment attached to questions or responses.

Curiosity —an observable trait in which the student exhibits exploratory activity.

Willingness to try difficult things —an observable trait in which the student takes risks by setting high levels of aspiration and attempting to achieve them.

Preference for complexity —an observable trait in which the student extends embellishment. The student with this trait not only embellishes questions and responses, but likes to "dig in" to complex designs and complicated information.

The child who possesses these qualities of productive-divergent thinking will be able to exercise the creative abilities he possesses to a greater extent. ◘

Summer Institute

The team of Drs. Nielsen and Clark and Helen Coe was faced with the task of blending the teachings of the "philosophers" with demonstrations by teachers known for their innovative techniques and with practice-teaching sessions where IMPACT teachers could innovate for themselves. All of this had to be fitted into the six-week summer institute format.

The planing sessions at which this blending took place were held on an almost daily basis, early in the morning, late at night and during lunches and coffee breaks. Flexibility was necessarily the most important factor, not only because of consultants' travel arrangements, but also to allow for the inclusion of ideas proposed by IMPACT teachers as the Institute progressed.

Listed below are the results:

Week I — June 10-14

During the first week, IMPACT Summer Institute participants were divided into three groups of about 40 members each. These, in turn, were divided into sub-groups, of about 10 members, each of which would serve as a "progess group" to study research and literature using small-group dynamics methods.

Subject-matter input for week one concentrated on communications —particularly small-group communications and inter-personal communications; on Guilford's "structure of intellect" model; and on the development of behavioral teaching objectives.

Psychological aspects of communication were explored by Drs. Ernst Beier, Russ Neal, Anthony Zener and Marshall Perkins, all practicing psychologists in Utah. The Guilford model and methods of setting behavioral objectives for students were outlined by Ralf Riches, Director of Elementary Education for Granite School District in Salt Lake, and Harlan Clark, principal of Farnsworth Elementary School, also in Salt Lake.

Week II — June 17-21

In week two, IMPACT teachers began practice-teaching sessions. Since they were divided into three groups, a rotation pattern was possible, so that, at any given time, group process, teaching demonstrations and practice-teaching classes might be going on simultaneously. Furthermore, each could be conducted with a workable-sized group in which all members could participate significantly.

Consultant for the second week was Darrel Allington, supervisor of instructional media for Granite School District. A media expert, Allington concentrated in this area, although he also discussed the applications of Guilford's model to the classroom situation. IMPACT teachers seemed most interested, it turned out, in Allington's unique applications of photography, and soon he had many of them developing their own color films with ease and producing their own filmstrip programs.

Week III — June 24-28

In the third week, IMPACT teachers were presented with two famous teaching techniques by people who have played large rolls in developing those techniques.

Richard Suchman demonstrated his inquiry-instruction method and Mrs. Betty Vary, Principal of Norwood Elementary School in Hilton, N.Y., demonstrated her application of paired-student learning. Both of these distinguished consultants also held "sit-ins" with IMPACT process groups so individual teachers could have full opportunity to question them.

Week IV — July 1-3

The shortest week of the IMPACT Summer Institute was also one of the most productive. Two of the giants in the field of creative teaching methods were available for consultation and demonstration for three solid days. Frank Williams demonstrated his productive-divergent thinking model, undoubtedly the most well thought-out and articulate application of Guilford's model to classroom procedures yet developed. And Cal Taylor held both small and large group sessions with IMPACT teachers to explain his writings on creative teaching "clues" and to elaborate on his multiple-talent approach.

Week V — July 8-12

The people who must ultimately find something of value in Project IMPACT are the teachers and administrators in the schools of Polk County and other areas of Iowa. Those who have found value in similar approaches can perhaps best explain to IMPACT teachers what that value is.

Three who have been "converted" are Bob Eberle, Assistant Superintendent of Schools in Edwardsville, Illinois, Lee Burton, Principal of Kearns Junior High School in Salt Lake and Loran Reynolds, English teacher at Kearns. Eberle and Burton each looked at the administrator's problems. Eberle proposed his "creative problem-solving" as an assist to the beleagured administrator and Burton explained ways in which the climate of a school or a district may be improved with respect to the adoption of innovations with as little friction as possible.

Reynolds is a hard-working classroom teacher who already uses many techniques encouraged by Project IMPACT. He showed the IMPACT teachers how he finds they work in practice. Some IMPACT teachers were a bit surprised to learn that they not only work, in fact, but that classroom discipline need not be destroyed in the process.

Week VI — July 15-19

Loran Reynolds made considerable impact on IMPACT teachers. He remained on through the final week to be available for the many private consultations and group sessions that had been requested.

Since it was the final week, no other input was attempted. Process groups and team teaching were emphasized so that IMPACT teachers could concentrate on those techniques and ideas with which they had come to feel most comfortable.

Had they to do it again, IMPACT's planning staff would undoubtedly do some things differently. No doubt the Institute could have been made to run more "smoothly." There was satisfaction, however, in the fact that IMPACT teachers were able honestly to explore, probe and put on trial in real classrooms the techniques the "experts" espouse and to take from them what they felt was most workable. This the IMPACT staff would not change. ☐

REACTION

The IMPACT teachers and teaching teams had a variety of reactions to the philosophical input given them in lecture and demonstrations sessions. Some frankly disagreed with one or another of the "philosophers." Many were wildly enthusiastic at first, but found themselves discouraged when they tried to out-Suchman Suchman, for example. To their credit, however, even the "non-believers" *tried* the new methods and techniques in their team-teaching sessions, and virtually all of the teachers found they could at least borrow bits and pieces of the various philosophies —with some increase in classroom effectiveness.

Recorded here is a brief sampling of the reports teachers made in their "daily diary accounts" of what they tried in the classroom and how they thought it came out:

"We discussed with the children the concept of 'what would happen if?' We asked them to imagine living without one of their five senses in order to help them recognize the amount and type of information they receive through their senses. They then went on a walk out of doors and took notes on the information coming to them through their senses. Afterward, they worked in teams to categorize their ideas. The result of this use of convergent, divergent and evaluative thinking techniques was a pleasant, useful and meaningful experience for each child and for the children as a group." ●

"We showed pictures to the children and told them to ask any questions that came to mind as they viewed the pictures. The response was poor. The children just didn't seem to be ready for this type of divergent thinking. We decided the children needed a gradual exposure to the divergent thinking process, and that we could do this by giving them more experience in cognition and convergent thinking before working into the divergent process." ●

"I was trying to get the children to understand that every child is a human-being, a human-doing and a human-feeling. One technique used was the sorting and classifying of children by all the differences we could think of. We made lists of these on the blackboard, and then had the children stand if they fit a category I would name. Age, color of hair, height, number of heads, feet, hands, eyes, noses, as well as favorite school subject, grade-level, favorite food, whether there was a car or a truck in the family; these were just a few examples of the differences we could determine. In the process, everyone discovered enough sameness and difference in himself and others to understand that no two children have the same pattern, but that this does not prevent them from living and working with other children." ○

"We had a 192nd birthday party for the fourth of July. We set the climate by playing patriotic music with the lights turned down and everyone sitting in silence. Then we 'brainstormed' the 4th, finding out customs and traditions pertaining to this holiday and discussed why it is celebrated. Each of the team teachers dressed as a president —George Washington, Abraham Lincoln and Lyndon Johnson —and read an actual speech once given by their respective president. We sang songs and watched a film about John Kennedy and then had a 4th of July parade through the school to the flagpole, where we had a salute to the flag. The students, of course, became very involved and the communication-flow was good." ○

"Each pupil was given a balloon in which baking powder had been placed so that when the balloon was inflated and let-go the flow of air could be observed. They experimented individually and recorded their ideas about what was taking place. Then, as a group, we worked to find similarities in their ideas. I was quite apprehensive about this approach at first, especially while balloons and baking powder were flying all over the room. But it soon became apparent that this encounter was the key to their learning the basic principles of action and reaction. They easily transferred this knowledge to the operation of jet planes and shotgun shells. I'm not yet sure I understand how much 'messing around' to permit, but the technique is a good one." ○

"Each student was blindfolded and given an object to feel. The object was then hidden and the blindfold removed and each student drew a picture of what he had felt. This was done three times, with the objects used becoming successively more complex in shape. The children thought it was fun and showed great interest in making finished, detailed drawings. We think doing it twice would probably have been sufficient, but we liked the technique." ○

"Our students decided they wanted to hold a panel discussion on the subject of marijuana. They found materials on the harmful and the harmless effects of the drug, then held the discussion, which was recorded on video tape. After the discussion, we watched the tape and they discussed ways they could have done a better job. The students learned about the harmful effects of marijuana, but they also learned how to operate in a group discussion more effectively. The boys, in particular, learned they were using their hands as defense mechanisms in the discussions and they all learned that groups all too easily stray from the subject. There were some defects; too many of the students stuck with the old tradition of giving an 'oral report,' used very little creativity." ○

"We brought a self-styled 'hippie' to the class. He spoke to us, and the students asked him questions about the movement —where hippies come from, what their purposes and beliefs are. The students seemed very interested and enlightened by their encounter with the hippie and we were satisfied that we had sparked their curiosity as we had intended to do." ○

"Our art class went by bus to a country park, where we found some sand which we could moisten and use to form original designs.

Then we mixed plaster which we poured over the sand designs to make permanent impressions. The students were very excited and so were we. The outdoor setting added to the pleasure. But a day-camp group was waiting to use the park and so we were pressed for time, which was disappointing." ○

"We gave the children imaginary ten-dollar bills and a stack of newspapers to use for an imaginary shopping trip. By searching through the ads, each child was to find three to six items that would have a total price of $10. It was very good practice in learning addition and subtraction (as well as in sharing materials) for those who got involved, but some children just didn't seem to get motivated. We're still not sure how we could have helped them to become more motivated." ○

"We demonstrated to the children that a box contained an object by turning it and letting them hear the sounds. We appointed the children a 'committee' to describe the sound the object made, the movement it made and its size. The words they thought up were listed on the board. A committee of children then acted out a pantomime of three words they felt described the object. The class was subdivided into four groups and each group went through the same process, except that the pantomimes could then be planned out by each group and presented to the other groups, who had not seen the words. There was good cooperation and, judging by the very creative summaries they prepared, the children found the experience very rewarding." ○

"Using a previous day's outdoor sketching as subject matter, the students were asked to experiment by reproducing their sketches in watercolors. The results were rigid, unimaginative; most of them wanted to do better, were disappointed with their efforts. Some seemed to be afraid to experiment because they might make mistakes. They definitely needed more basic information on the use of watercolors before beginning this project." ○

"We presented a demonstration on the use of a shotgun shell loading machine, but without explaining it. The children were then asked to think out for themselves how the machine worked, write down directions and then try it themselves to prove the validity of their directions. This was used in succeeding classes as a basis for discussions on the importance of giving adequate direction, and their impact on our daily lives." ○

"We drew a diagram of a baseball diamond on the board, then each student was asked to show where he would hit the ball, where he would throw it or what kind of a play he would use in a given situation. The group-discussion technique was used, and in each case, when a student made a suggestion about a play, he had to put it in terms of the laws of physics. All of a sudden, it became clear that science is very much involved in sports, and our discussion ranged from why the pitcher's mound should (or shouldn't) be higher, to why some players are better than others. It was fun and we learned." ○

"I started a story, then stopped at an exciting point and called on a child to continue it. After this demonstration, we divided into groups and I gave one child in each group a story beginning, and they passed it along from one to another using the same technique. The children were excited and they had fun, too." ○

"We watched the movie 'The Hunter and the Forest.' Then we wrote the categories 'sound,' 'color' and 'object' on the board and the students were asked to place things they remembered from the film in the proper category. After that, we used the words in each category to make sentences. The children enjoyed developing the lists, but didn't cooperate well in developing the sentences from them." ○

"I directed the attention of the class to a visiting toad. They observed him and told me all they noticed about the little fellow, whom they named 'Oliver.' I wrote all of the descriptive words they used on an overhead transparency and when we completed the description session we made up a short poem about Oliver. The children seemed pleased that they were able to express ideas in poetry and work as a group. I was proud and excited. The next day we used the children's poem to write a song, using the same technique and the overhead to record the music as we developed it." ○

"Our music class drew imaginary instruments and then imagined what they would sound like if they were real. One of the instruments developed was the 'Bass Boom-Boom,' which we decided would sound like a bass drum but would be designed to look like a string bass. Another dropped vegetables when it was played. Several designed more than one instrument and all seemed eager to explain their reasoning in giving their instruments certain characteristics and sounds." ▣

BLUEPRINTS

Out of the lectures, the demonstrations, their own work in practice-teaching sessions and the "process" groups in which they participated, IMPACT teachers developed plans for the future. Some probably felt much of the "teaching for creativity" to which they had been exposed was too loose or unstructured for them to use in their own classes. Others became "true believers" and planned to put this new doctrine into use in its entirety. But most seemed to see certain techniques they could borrow from the "philosophers" and from the teaching demonstrations, and certain others that they simply knew would not work for them and their students.

Several IMPACT teachers —either as groups or as individuals— made up plans-of-action, laying out blueprints for themselves to follow in implementing the new creativity approach. Only a few of these blueprints can be outlined here, but they have been selected because they are typical.

"When a teacher creates a classroom climate characterized by 'realness' and empathy, he discovers he has initiated an educational revolution. Learning of a different quality, proceeding at a different pace begins to occur. Learning becomes live. The student is on his way to becoming a learning, changing being.

"How is all this important to me? First, I plan to broaden the range of thinking skills in my classroom. I am in the process of developing materials that will strengthen the areas that are weak —materials that will strengthen creativity with words, pictures, stories, poems, develop fluency, association,flexibility and elaboration.

"I feel I have gained an understanding of the various ways to create a climate within the classroom conducive to creative thinking and production, and how to keep this climate going in order to make learning more meaningful to the child. I am now aware of the multiple talents of children that curriculum never touches on and I am going to try to develop the students in these areas.

"I plan to individualize my reading program, develop various subject areas in interest centers, change my method of grading from cards to graphs showing the progress in the subject areas *and* the talent areas. Most of all, I'm going to try to develop the kind of relationship with the students that will foster truth, confidence and love. I want them to be aware I am a *person*, who is deeply interested in them as *persons*. Together, I want us to struggle, to share, and to trust so we can all become self-sustaining, more creative persons." ○

"I teach at a school where many of the faculty members have been long-steeped in the traditional approach and comfortably acknowledge this technique to be 'best for our kids.' Furthermore the majority of youngsters seem to believe that the traditional approach (as they understand it) is the best way to learn —even though it may be distasteful. The parents support the teachers, but usually this support takes form in a statement like 'I beat him at home to get things done; you do the same at school and maybe he'll finally amount to something —just don't hit him on the head!'

"Now all I have to worry about is to introduce the 'creative' approach, group process and the inquiry method. How do I begin? Who can I enlist to help? And, to be really honest, how far am I willing to go myself? For ten years, I've believed almost completely that the traditional approach was the only way to get the material across. My 'hard core' experience tells me to pound the information into them, and, really, I've been rather sucessful with this approach. But I must admit that IMPACT has shaken my hard core. As a consumer of educational techniques, I find the IMPACT methods an attractive product.

"So, while I acknowledge that I'm not going to make any sweeping changes in my school right away, I have to try. I'll be content to see my language arts department become aware that something new is happening —and it must begin in my own classroom.

"I've completely reversed my position on spelling. I used to stick strictly with the spelling book. Students did spelling practice, took the prescribed test for the week and practiced some more. This fall, they'll work in teams of their own choosing. Teams will write words they think they know how to spell and construct lists. When they take tests, they'll check each other's papers and rewrite the words they missed.

"I'm also thinking of combining a literature unit and library skills unit. I've collected back issues of *Reader's Digest* and plan to let students read them as they desire. Then they could place the copies according to a Dewey decimal system so other classes can use them as references for reports, themes and oral presentations."

"My self-confidence has been reinforced because I've found that methods I've had success with in the past have also been discovered by the researchers and found theoretically sound.

"One of the most important aspects of implementing these techniques, however, is usually paid lip-service only —learning to *listen.* IMPACT process groups and team-teaching sessions have helped me understand what it means to *really* listen and have alerted me to the importance of being sensitive to children's needs.

"The various consultants each looked at creativity from a different angle, and each had a different emphasis and terminology. I found I could not 'buy the package' each of them promoted, but I did find in each some ideas I could adapt.

"I believe, for example, in Suchman's inquiry philosophy, and yet I feel a personal need to state objectives in the behavioral terms Mager has written about. Betty Vary's emphasis on pupil-team learning was meaningful to me because I've used it before in the classroom, but I would emphasize that the method shouldn't be limited to memory exercises. It can also be used to promote productive thinking.

"I don't completely understand Guilford's model, but I have found it helpful in classifying kinds of thinking. Frank Williams helped classify these thinking processes and gave ways in which each could be developed.

"For the future, I have developed a set of guidelines I think will help me:

1) Radiate a positive attitude, but don't be authoritarian.
2) Share ideas and encourage others to try new ideas, but don't 'oversell.'
3) Be sensitive to pupil and teacher reactions to your ideas.
4) Be tolerant of the anxiety change engenders.
5) Implement new ideas and methods in the classroom.
6) Anticipate objections to and misconceptions about what you are trying to do.' ●

"It seems to me two of the most helpful and promising techniques presented at the IMPACT Summer Institute were the communications and group process sessions. Both of them seem to have potential as innovations for inservice training in my school district. Teachers could learn to know each other better by becoming more sensitive to the problems and needs of their co-workers. Faculty members would become more aware that they are frequently working toward the same objective in different ways, and there would be generally more effective communications among parents, administrators, teachers, students, school support personnel and the general public.

"I propose that small groups of eight to ten people be used to tackle problems in each building and at the district level by using divergent thinking to develop alternative solutions to problems and then using convergent thinking and evaluative thinking to select the best possible solutions.

"Another suggestion —and this came from our IMPACT process group— is that video tapes be made of a process group in action. These tapes could then be shared in inservice meetings at a number of schools in the district without using the group members' time to appear at each school. It would still give the teachers and administrators at these schools a good idea of how the process group can be used as a problem-solving agent.

"Finally, I propose that outside speakers, prominent in education, psychology, philosophy and other fields, be brought into the inservice program, along with good films, filmstrips and video and audio tapes.

"As groups become acclimated to the innovative ideas involved in productive thinking and creative teaching, they can share, expand, transfer and apply them on an inter-group basis. The end product would be the solving of educational problems in more dynamic and satisfying ways." ○

"Last August I became a member of IMPACT with some serious reservations. 'Creative' to me meant a room full of artwork, possibly with orange-crate furniture, and layed-out by a committee. When someone finally suggested that I substitute the expression 'productive thinking' and explained what *that* meant, my fears were overcome.

"I still had to re-tool, however, and I think the most important techniques for doing this are the following:

1) 'Tuning-in' to kids. Listening more to the children and developing a greater sensitivity to their needs will help in planning work that will involve them.

2) Considering levels of thought in planning instruction. This can be done using Guilford's structure-of-intellect model and Bloom's Taxonomy.

3) Working in groups or pairs. I see this as an aid in encouraging slow readers in social studies and think it will be valuable in my spelling classes. I hope to make each student feel responsible for his own and his partner's progress.

4) Pupil-planning. Children find it much easier to get involved in their studies when they plan their work program for themselves.

5) Develop ideational fluency, using divergent thinking exercises to get children started in each subject-matter area.

6) Relate all subject matter to today's world.

7) Help children develop good interpersonal relations —help them tune-in to each other.

8) Use videotapes to see if there is too much teacher input and to see what types of thinking the children are doing." ○

"As an IMPACT teacher for the past year, I had an opportunity to try many of the 'creative teaching' methods before the summer institute. I have been very pleased with many of the results. I have abandoned the basic language text I was using because I've come to believe we learn best by doing. Now I use the children's own writing exclusively. In the coming year I hope to continue in the reading areas by using trade books tailored to individuals."

"It has been our experience that classes which allow the students freedom to intellectually explore and inquire use their own intuition in making musical judgments, commence on their own level of understanding and discover for themselves the nature and principles of music to a greater degree than conventional classes. This indicates that new levels of student involvement *are* possbile.

"To create an environment where students can be creative and feel free to contribute and express original ideas, there must be a respect and an appreciation for all contributions. The student must feel secure in his surroundings and know that his ideas will be respected. He should learn to understand that there is not always a 'right' or 'wrong' answer, but that is his prerogative to choose the material which he thinks is most suitable in a particular situation. He must feel free to experiment.

"Most children at the lower elementary levels feel no hesitancy to express ideas and will improvise musically to questions sung to them. We stress 'thinking music' —being able to express musical thoughts vocally. There is little emphasis placed on drill or traditional rudimentary factors such as note values, staffs, clefs and other visual notational devices. It has been our experience that these mechanical details are readily understood by the student who has grasped the musical concepts of melody, rhythm and expression which give such devices meaning in the first place.

"Through the first three grades, notation of original composition is handled largely by the teacher. Usually, an overhead projector can be used so the student can see the visual translation of his musical thoughts. He becomes familiar with notational problems and procedures while, at the same time, his musical imagination is not restricted by his own notational skills.

"In the upper elementary classes, we still work on group projects, but these are of increased complexity to stimulate motivation. Some students contribute more than others to these group projects, but all gain an understanding of how musical composition is created.

"Students make suggestions and, after these are discussed, a vote is taken. As in all democratic processes, there are usually some who are not satisfied with the majority decision. This is usually handled by asking them, 'why don't you and your friends try to work out something along the lines of the idea *you* favored?'

"Many students also develop projects of their own involving instruments which they are studying and find a need for increasing their skill in expressing musical ideas. Time is provided for students to come to teachers for help on these special projects, but it is up to them to seek the help."

Research

During the year that Project IMPACT has been in operation, a research program has been conducted in an effort to determine whether its major goals are being achieved. Under Dr. Norma Trowbridge's direction, this research effort has emphasized two types of investigation:

(1) Subjective Investigations which rely largely on value judgments made by IMPACT participants and staff.

(2) Objective investigations, planned according to research designs and carried out with as great a control of variables as possible so they may be statistically analyzed.

The subjective evaluation process, of course, is occurring daily as the IMPACT idea grows and is modified to meet new needs. In fact, much of this booklet has been devoted to reporting this type of evaluation. It is valuable and informative, and it possibly makes the most interesting reading, but there are some things it cannot do.

For one thing, with all that is said and written about the subject of creativity these days in education journals and magazines, how do we know an IMPACT teacher has attitudes different from any other teacher? For another, how do we know we are actually *changing* teachers and not just selecting the most creative teachers in the first place?

To answer this type of question, some objective tests are needed. No attempt can be made here to give details of this "objective" research —IMPACT issues periodic research reports which do that— but in very brief, generalized terms, the following has been discovered:

First, when compared to a carefully "matched" group of non-IMPACT teachers and administrators (i.e., very nearly the same in type of position held, school district they work in, subject matter and age-level taught), IMPACT participants *are different.*

To a greater degree than the control group, they tend to argue for their own points of view, to be leaders in groups to which they belong, to be regarded by others as leaders, to be elected and appointed to offices and committees more often, to make more group decisions, to persuade and influence others to do what they want and to supervise others' actions more often. In other words, IMPACT people are more "dominant."

At the same time, IMPACT teachers and administrators tend to place less value than non-IMPACT people on having written work be neat and organized, making plans before starting a difficult task, keeping things neat and orderly, organizing details, keeping letters and files according to a definite system and having things arranged so smoothly that little change is ever necessary. In a word, according to this finding IMPACT people are less "orderly."

Since both dominance and lack of orderliness (as defined in the Edwards Personality Preference Schedule, one of the measures used in the research) are indicative of "creativity," the IMPACT teachers and administrators definitely appear to be relatively more creative than their contemporaries.

The question remains as to whether a teacher can be expected to change as he participates in Project IMPACT. Again, only gross generalizations can be made here, but certain changes do appear to take place.

For one thing, the teacher apparently improves his ability to evaluate students in the convergent, divergent and evaluative thinking processes as he participates in the IMPACT program. Furthermore, his confidence in his ability to make this type of judgment improves. Finally, exposure to the IMPACT approach develops in the teacher an understanding of a wider array of the types of thinking people do.

One year is precious little time to be able to make significant research findings on a project of IMPACT's scope. This is doubly true because IMPACT has continually changed as it has developed through the year. Nevertheless, the evidence gathered thus far indicates the project has caused teachers to grow in awareness and improve their abilities in certain ways which they themselves believe valuable.

The ultimate aim of IMPACT research, of course, is to determine whether students become more creative when they are exposed to the methods IMPACT encourages. Very frankly, there is no really reliable measure which will yield statistical data to demonstrate whether this occurs. When such a measure is developed, it will undoubtedly depend upon the judgments of good educators, however, and the present indication is that many good educators believe IMPACT's methods will, in fact, produce more productive thinking in students. ■

CONCLUSION

The "scientific method" has become the hallmark of our generation. The use of purposeful, carefully controlled research in the physical sciences has been of obvious benefit to all of us. The modern automobile, television, jet travel, communications satellites, atomic power, computer technology—these are just a few examples of what this practical application of research has accomplished.

When will we begin to apply this same scientific method to living together in a free society? As was mentioned earlier in this brochure, research in "creativity" has been going on for some thirty years. Its findings seem to indicate a whole new approach to education; an approach which could result in every child being able to fully develop his potential in all his talents. More productive, better informed and more capable citizens might be the ultimate outcome if our education system were to take full advantage of the findings of this research.

The sad fact is, however, that those findings are not being applied on any large scale. Today—as when I issued my original statement on creativity four years ago—the emphasis in most classrooms is on memorization and recall.

Project IMPACT has produced a refreshing exception to this general trend. For the past year, IMPACT teachers have made a concentrated effort to inform themselves of pertinent research and theory and they have applied these to real children in real classrooms.

What they have found by doing this is that some of the research and theory has real value and some has little or none—and this is a great stride forward. They have found, further, that they've had to renew again and again their determination to define what "teaching for thinking" really is and have discovered that it goes well beyond what we commonly call "creativity."

What IMPACT has accomplished in its first year is significant. It has pointed the way to a more humanized, more productive education process. This, of course, is only a beginning. What has begun in IMPACT must be broadened to areas outside Polk County and it must be continued over the years. But if IMPACT did nothing else in this first year, it made evident this need for a broad-based, long-term inservice education program. This alone would have made the efforts of IMPACT teachers worthwhile.

I am convinced the IMPACT idea *will* spread because I know most good teachers everywhere see the value of breaking away from the bonds of simple memorization into the wide world of productive thinking. Already, of course, many schools and school districts in other parts of the country have begun to explore innovative ideas in education. Where it has been feasible to do so, IMPACT has taken advantage of these innovations.

I believe, however, that IMPACT is a unique approach which combines what has already been discovered with an adventuresome search for even more effective ways to improve the teaching and learning processes. I am proud of what has begun in Polk County.

Ralph C. Norris, Superintendent
Polk County Board of Education

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CREATIVITY CRITERIA FOR EVALUATING TEACHERS AND STUDENTS IN CLASSROOMS

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The purpose of the research was to develop criteria measures by which to evaluate Project IMPACT, a Title III project designed to promote creativity.[1]

A common goal of educational programs is to increase the amount of creativity exhibited by teachers and students. Nearly all children presumably have ability or capacity for creative expression, and researchers generally concede that this ability is distributed in varying amounts along a continuum.

The evaluation of programs to encourage creativity in students has long been difficult because the definition of creativity is a problem. Even when the definition problem is solved, adequate measuring instruments present further problems.

The present study was designed and undertaken to develop criteria measures by which the staff could evaluate the effectiveness of workshops, summer institutes, and other staff programs provided to the teachers and students of one county under this Title III program (see Trowbridge, 1969).

The study hoped to test some assumptions about thinking processes involved in creative thinking. In particular, it was hypothesized that teachers who were teaching with more creative approaches would exhibit more divergent thinking than those teaching in a less creative manner, and that if Project IMPACT was actually generating more creative teaching in schools in Polk County, Iowa, students and teachers in the project would show more divergent thinking than those in the matched comparison sample.

PROBLEM

Creativity is an elusive concept, and any evaluation of Project IMPACT or its effect on teachers, students, or the teaching-learning process must depend on the definition used.

In the past, at least three approaches to the problem of definition have been used. Creativity has been defined in terms of (*a*) the person–the traits and characteristics of the creative individual, (*b*) the process–the ongoing thinking-behaving procedure involved in creative expression, and finally (*c*) the product–the productions or ideas the person creates.

In this study the product approach was adopted, and it was decided that actual classroom behavior when teacher and students were interacting would be considered the product of creativity.

At the heart of creativity, as at the heart of learning, is the process we call "thinking." Any measure of the behavioral product of creativity, therefore, must somehow ultimately measure thinking processes.

Guilford (1968), in seeking to establish such a measure, has developed a well-known model of the structure of the human intellect. The model is extremely complex, including potentially 120 different operations of which the human intellect is capable.

Guilford does, however, simplify things somewhat by separating this multitude of operations into five general categories which are somewhat easier for the researcher in the field to apply to "real-life" situations. These five basic thinking operations categories are: (*a*) memorative thinking; (*b*) cognitive thinking; (*c*) convergent thinking; (*d*) divergent thinking; and (*e*) evaluative thinking.

Of the five categories, Guilford believes the *divergent* thinking operations are most indicative of the "creative" person. Accepting divergent thinking as an indicator means that some tool or instrument for measuring divergent thinking in the classroom and for making comparisons among the five categories is necessary.

In their work at the University of Illinois' Institute on Exceptional Children, Aschner and Gallagher (1962) were faced with a similar need for a measuring instrument. They developed, as a result of this need, a form of "verbal interaction analysis" especially designed to measure the thinking processes in Guilford's model.

METHOD

The Aschner-Gallagher (1962) method classifies the type of verbal responses of an interacting group, and it does this in terms of Guilford's (1968) classifications of thinking processes.

The method used in this study involved making a count or "tally" every 15 sec. Thus, if "divergent" thinking was being exhibited at a given 15-sec. mark, a tally was recorded under the "divergent" category. The tallies in each of the five Guilford categories were then totaled and the results were displayed as percentages of time. If, for example, the "memorative" thinking category received 15% of the tallies, it was concluded that 15% of the classroom time during the measurement period was devoted to that category of thinking.

In addition, Aschner and Gallagher found it necessary to account for classroom time in which no actual interaction between students and teacher was going on. They therefore added a category called "classroom routine."

This interaction analysis method was applied to the IMPACT research conducted in the school districts of Polk County. A variety of media for carrying out the analyses were tested, including actual in-the-classroom tallying, and tallying based on video and audio tape recordings. Of these, the last, audio tape, proved most satisfactory because it created the least disturbance in the normal classroom environment.

One advantage of both audio and video tape recordings was that they could be replayed whenever an analyst had doubts as to which category a certain type of classroom behavior belonged.

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[1] Project No. OEG-3-7-703575-5055, a three-quarter of a million dollar project funded under Title III, Public Law 89-10.

Subjects

Two sample groups of Polk County teachers and students were used in the test. A small sample of teachers actually participating in the IMPACT program was selected to see how their behavior would change over time as their exposure to IMPACT's instructional techniques increased.

A much larger sample, made up of both IMPACT and non-IMPACT teachers, was chosen to see how the classroom of an IMPACT teacher might differ from that of a non-IMPACT teacher.

For purposes of comparing IMPACT teachers with non-IMPACT teachers, a sample of 108 IMPACT teachers' classrooms and a matched sample of 114 non-IMPACT teachers' classrooms were selected.

RESULTS[2]

Longitudinal Study

Tables 1 and 2 summarize data on the interaction analyses performed with the longitudinal sample, in which evidence of change over time was sought. A 1-hr. audio tape was analyzed for each teacher at each of the three times during the year (October 1967; May 1968; July 1968). Table 1 displays data concerning the amount of time teachers talked, and over the 9-mo. testing period, a marked decrease was noted in teacher-talking percentages.

TABLE 1

Study over Time: Comparison of Percentages of Teacher- and Pupil-Talking Time

Date	Teacher talking	Pupils talking
October 1967	66.1	33.9
May 1968	58.6	41.4
July 1968	42.2	57.8

Note.–By χ^2 test, differences were significant beyond the .05 level.

TABLE 2

Study over Time: Percentages of Classroom Time Devoted to Guilford's Thinking Processes and to Routine

Date	Memory and cognition	Convergent	Divergent	Evaluative	Routine
October 67	19.2	21.4	10.8	10.3	38.3
May 68	14.7	12.2	24.1	19.8	29.2
July 68	14.6	20.3	25.2	26.7	13.2

Note.–By χ^2 test, differences were significant beyond the .05 level.

Table 2 shows a rise in the percentage of divergent thinking from 11% in October to over 25% in July. An especially interesting finding is the marked decrease in time devoted to classroom routine

Cross-Sectional Study

Tables 3 and 4 are based on analyses of a 1-hr.-long tape made in each of 108 IMPACT classrooms and 114 non-IMPACT classrooms in May 1968. It can readily be seen that pupil-talking time was higher in IMPACT classrooms than in non-IMPACT classrooms. Again, though IMPACT staff had never made an explicit goal of classroom management reduction, a major finding was a great reduction in time devoted to routine chores.

TABLE 3

IMPACT vs. Non-IMPACT: Comparison of Percentages of Teacher- and Pupil-Talking Time

Classroom	Teacher talking	Pupils talking
IMPACT	60.7	39.3
Non-IMPACT	71.2	28.8

Note.–By χ^2 test, differences were significant beyond the .05 level.

TABLE 4

IMPACT vs. Non-IMPACT: Percentages of Classroom Time Devoted to Guilford's Thinking Processes and to Routine

Classroom	Memory and cognition	Convergent	Divergent	Evaluative	Routine
IMPACT	15.3	26.6	16.2	14.5	27.4
Non-IMPACT	13.6	21.7	12.2	11.3	41.2

Note.–By χ^2 test, differences were significant beyond the .05 level.

Reliability of Results

In any study based on personal observations, the reliability of the observer is a crucial variable. No guarantee of absolute reliability can be made, of course. Researchers can, however, test for interobserver reliability by measuring how often they agree with each other in making judgments. When computed for the analysts used in this study, the coefficients of reliability were: (*a*) Analyst A compared with B–.991 for teacher talk and .906 for divergent thinking; (*b*) Analyst B compared with C–.989 for teacher talk and .923 for divergent thinking; and (*c*) Analyst A compared with C–.987 for teacher talk and .897 for divergent thinking.

CONCLUSIONS

These major conclusions emerge from the study.

1. The amount of student participation and time devoted to thinking activities was higher in IMPACT classrooms and consistently increased.
2. A marked change was evident in the proportions of time teachers devoted to various thinking processes.

Implications for further study seem clear. The major need is for continuing the same measures for the next 5 yr. to make conclusions much more meaningful.

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[2] Complete transcripts of data have been filed with the American Documentation Institute, Photo Duplication Service, Library of Congress, Washington, D.C.